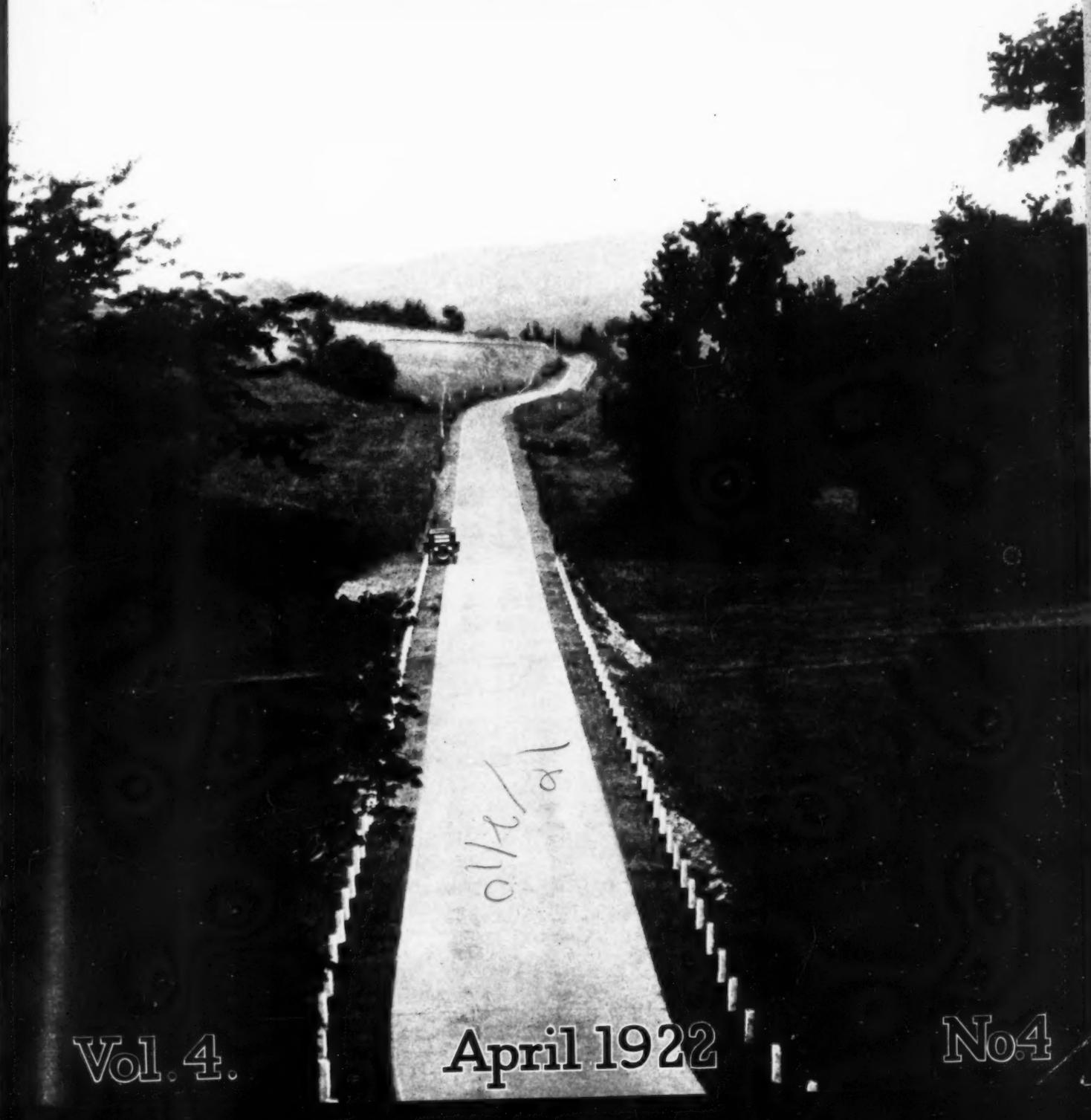
Successful Methods

Construction - Road Making - Engineering - Industrial - Mining



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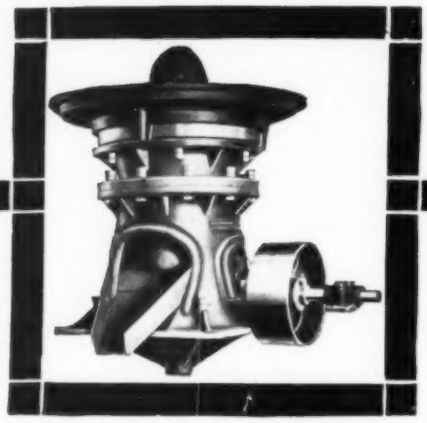

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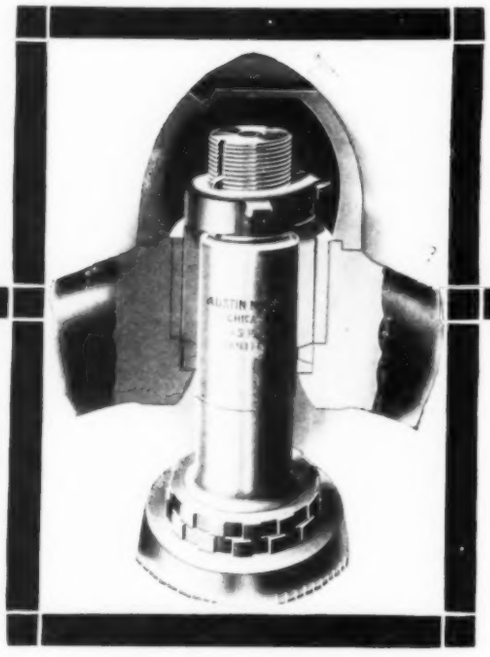

Like the lubricating system, the main shaft suspension is but one of several exclusive features which are responsible for the remarkable records made by Austin Gyratory Crushers. Catalog 29-X tells the whole story of Austin Crushers and contains much valuable engineering data. Your files will not be complete without this catalog. Write for one today.

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The Best Concrete Road Building Method

DO not start to read this with a chip on your shoulder. You may have the best method of building concrete roads—under your conditions. Some other man has an entirely different method—which is best for his conditions. That is the whole story of concrete road building experience to date. There is no one "best" method.

Conditions vary so greatly in different states and in different parts of the same state that a method which is best for one set of conditions may be impracticable on another job near by. Mixers, material-handling machinery and haulage equipment are all necessary on every job. Just what method of using the various types of mixers, machinery and equipment is best for a certain job depends on too many local conditions to permit any standardization of layout.

In view of this self-evident situation, road builders are going slowly in accepting as the last word any method that is proposed. The road builders who are making good are studying each job as a job by itself. True enough, they fall back on their experience for certain features of equipment and organization. But they do not permit any pet hobbies to block their judgment. Just because one plant layout proved a money-maker under certain conditions, they have common sense enough not to try to use the same layout under entirely different conditions.

All this is heresy to a lot of folks whose experience has all been with about the same conditions on their different jobs. Some of these men just simply know what is the best method of handling and hauling the materials and of mixing and placing the concrete. They will tell you so, too. But by "their fruits ye shall know them." While an orange tree produces well in Southern California, it would have hard sledding alongside of a peach tree in Michigan.

Shutdowns

ABOUT the time things get to going right on many jobs this spring some machine will go wrong. Then the whole works will stop. Everybody from the head office to the foreman will cuss in a way that would make a Wyoming cowpuncher blush. The maker of the machine will be condemned in forty ways to the stokehole of eternity. When the air clears, so the real cause of the breakdown can be located, in just about four out of five cases lack of proper upkeep of the machine will be found to be responsible.

Few construction men give their equipment half a chance to keep going. A railroad master mechanic would never believe the punishment that most plant gets on a construction job. It isn't just hard use. It is the lack of frequent, regular cleaning, oiling and minor repairs. The wonder is that the plant stands up as well as it does under the lack of attention it receives on the average construction job.

Of course, construction men, who are successful in the long run, give their plant and equipment the kind of constant care which eliminates most of the breakdowns that occur on the work of other less cautious concerns. Such men realize that thorough lubrication is the first commandment of the mechanic's decalogue. They know that the little work necessary to keep bearings running cool, mud out of the boiler, carbon out of the cylinders, or dirt out of the wrong place costs practically nothing, as compared with the loss due to a shutdown on account of a machine out of commission.

Good construction machinery is designed to stand up under much misuse. There is a limit to the neglect, however, that the sturdiest equipment will endure. What a good factory or shop mechanic would call half-way reasonable care will keep most construction plant going in good shape. The point is that the little details must be looked after frequently. The accumulation of trouble-making conditions must be prevented. If the boss knows his job, his men can easily be coached to look after their machines in this way, so that most of the shutdowns can be prevented.

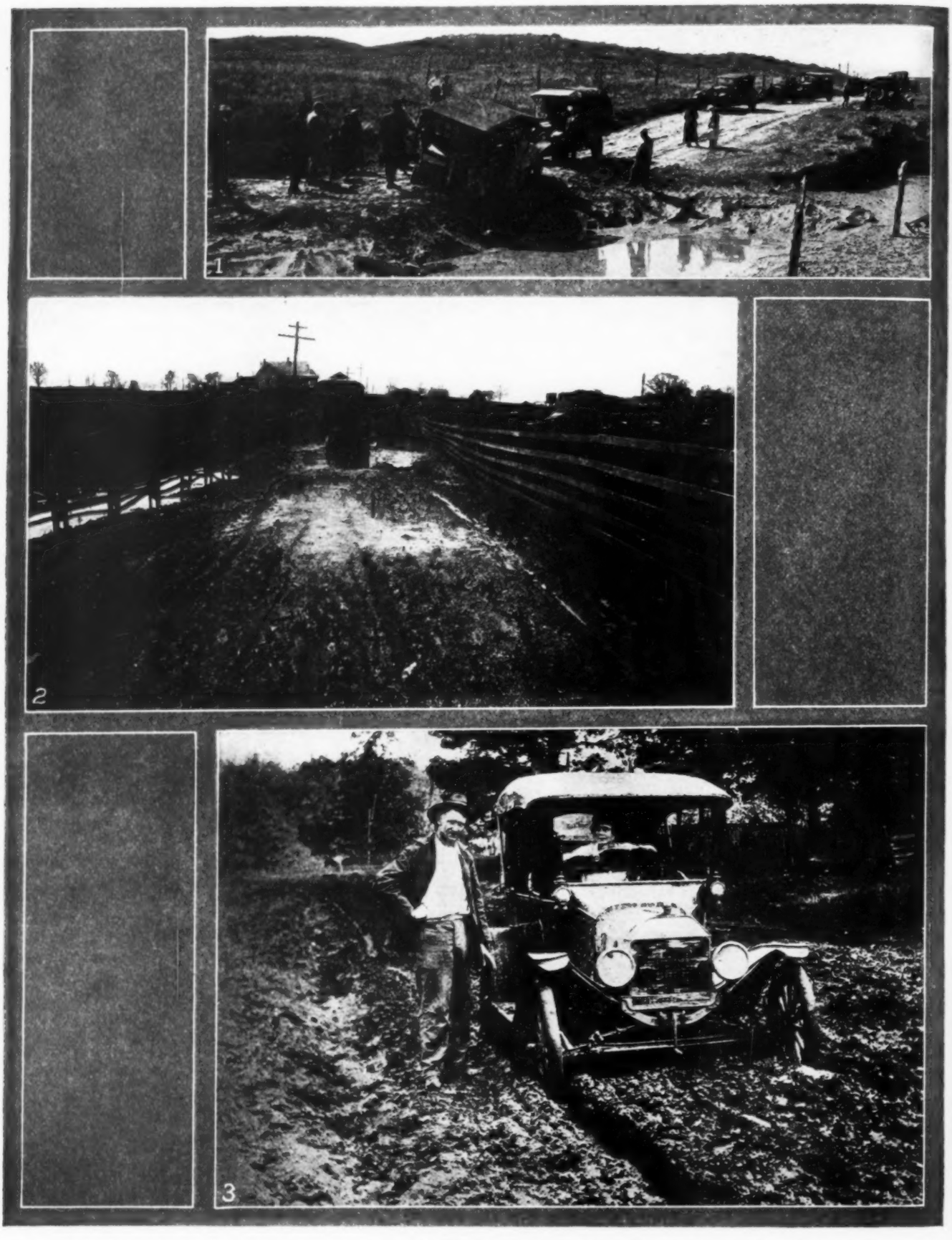
Tell the World About It

ON nearly every construction job some little stunt is worked out to save time or money, or both. Some of these stunts are new; some have been used before. Most of them are worth telling about. They give other men an idea such as you yourself want once in a while. You gain nothing by hiding them under a bushel.

We want to print more short stories about such little kinks for saving time or money or trouble. Send us something about some idea that you have worked out that would interest other construction men. Don't try to write it up. Just give us the dope and what pictures you have, or a sketch showing the idea. We will shape the stuff up ready for printing. If you want us to, we will send back to you for your approval whatever we write.

Look around on your job, or through your pictures, and send us something now.

Soon To Be Forgotten

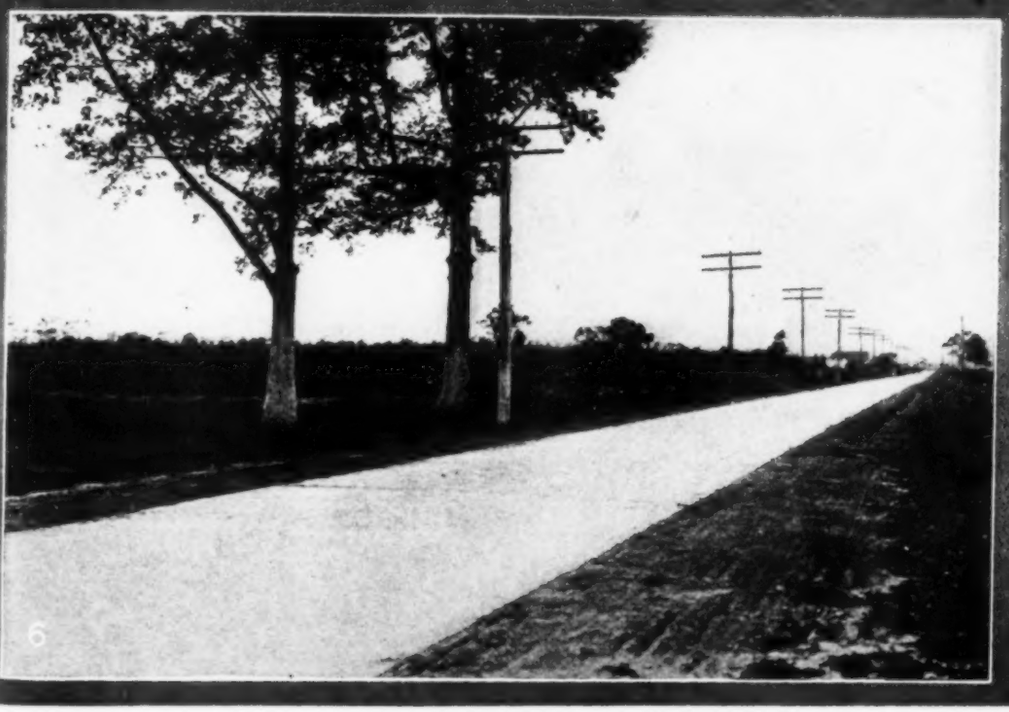


1—A broken culvert after a heavy rain caused this blockade on a road in a Western state. © *Underwood & Underwood*

2—The central part of the country is represented by this road, which since this photograph was taken has been repaired and is now a first-rate highway. © *Underwood & Underwood*

3—The East is responsible for this quagmire masquerading under the name of a road. It is a good example of the sort of road that soon will be no longer tolerated. © *Underwood & Underwood*

Long To Be Remembered



4—This concrete road is part of the Dixie Highway in Illinois.
5—A cement concrete pavement in New Mexico. The El Paso road near Las Cruces.
6—Another good example of a concrete road. This one, 16 ft. wide with earth shoulders, is in Delaware. All three of the roads shown on this page are of the type which is lifting the whole country out of the mud.

QUICK WORK ON A WINTER JOB

Sixty Grain Tanks, 96 Feet High, Built in 65 Days by James Stewart Company

JUST 65 days after concreting was started, the construction of 60 reinforced concrete grain tanks 96 ft. 6 in. high was completed by the James Stewart Co. for the Western Maryland Railroad, which is one of the chief carriers of grain to the Port of Baltimore.

Six years ago the Western Maryland constructed at Port Covington, Baltimore, a 1,000,000-bushel elevator for the storage and handling of grain from railroad cars to ocean vessels. The following year the elevator's capacity was increased another 1,000,000 bushels. In 1921 the James Stewart Co. was awarded the contract for a 1,750,000 bushels additional storage, an addition to the working house where the grain is received, two-thirds larger, as well as extending the loading gallery 300 ft. When all this is completed, the Western Maryland will be able to load at one time three of the largest types (12,000 to 15,000 tons) of grain-carrying vessels or four of the smaller types (5000 to 7000 tons).

This increase of the storage capacity by 1,750,000 bushels, which means the construction of 54 large reinforced concrete tanks having a 20-ft. 6-in. inside diameter and 96 ft. 6 in. high, 32 smaller bins, made by the intersections of the larger bins, as well as the enlargement of the workhouse and loading galleries before mentioned, will cost approximately $700,000.

The first equipment arrived on the job Sept. 15 1921. The plant was set up and concreting was started on Oct. 1, and 65 days later, on Dec. 5, grain was placed in all the tanks of Annex 3, or a battery of 36 of the large tanks and 24 of the smaller. For this set of tanks, 11,891 cu. yd. of 1-2-4 concrete were placed, as well as 361 tons of reinforcing steel. For practically half of the 65 days, 3 shifts were worked. The balance of the time one 8-hour shift handled the job. One shift consisted of 2 carpenters on forms, 50 laborers and 3 hoisting engineers.

The foundation consists of a concrete slab or mat, 2 ft. 8 in. thick, reinforced, under all the tanks. A basement is constructed on this foundation which houses the conveyors, etc. The basement roof consists of girders, supported on columns, roofed over with a 12-in. reinforced slab which forms the floor of the bins above. On this floor was placed the movable forms for all of the 36 large and 24 small tanks. These forms were built solid and were 4 ft. in height. By means of 284 specially designed screw jacks, the forms were raised continually from the time the first concrete was poured until the tanks reached their final height of 96 ft. 6 in. A 6-in. slab was then placed over the top, which forms the roof for the outer portion of the tanks. A reinforced concrete building 9 ft. high, built with stationary forms, occupies the remainder of the roof and accommodates conveyor belts for distributing the grain to the various tanks.

The methods used to raise the forms are shown in

THIS PHOTOGRAPH AND THAT ON THE OPPOSITE PAGE SHOW THE GENERAL ARRANGEMENT OF THE CONCRETING PLANT. THE SAND AND GRAVEL ARE UNLOADED FROM BOATS AT THE LEFT.

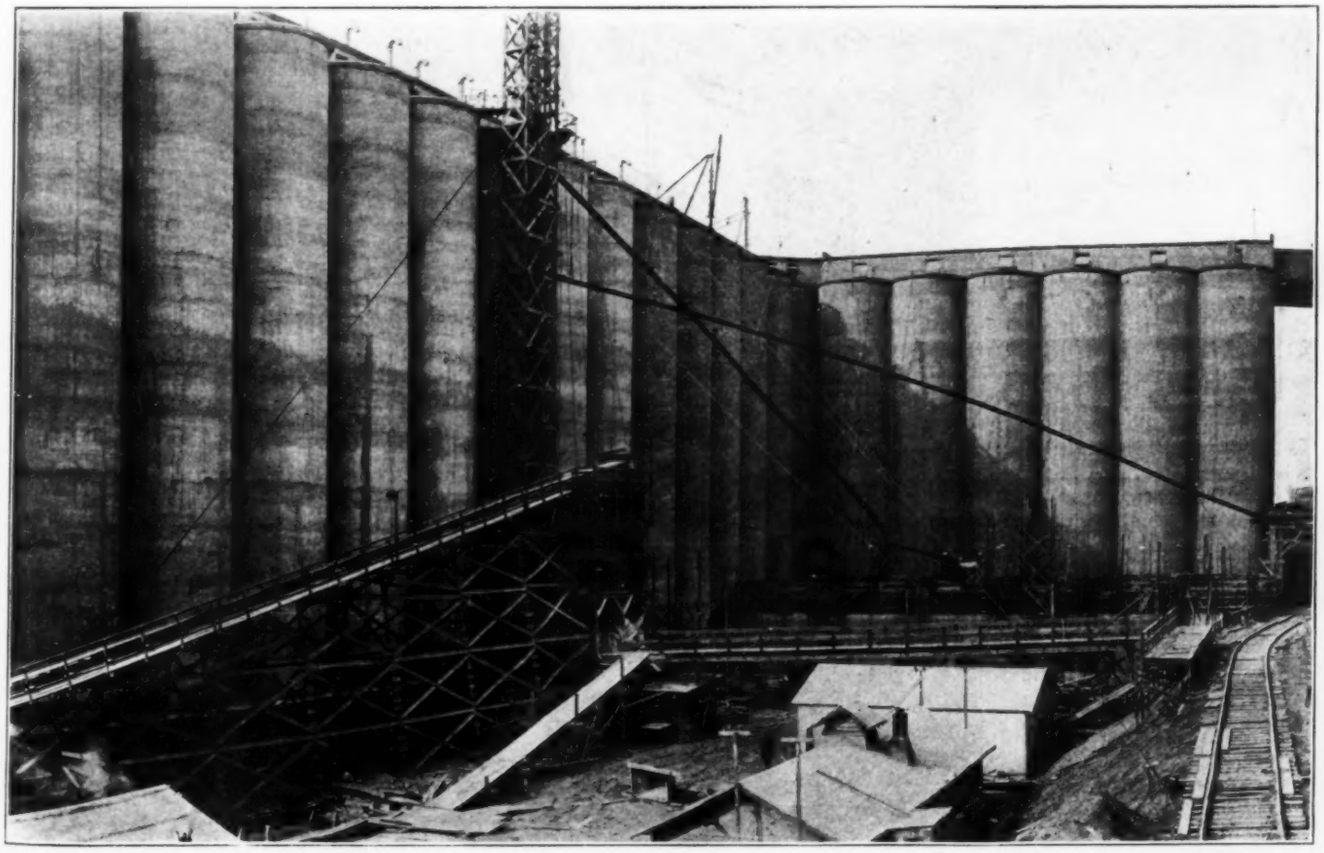
the series of three photographs at the top of page 6. Two of these views were taken on Nov. 14, 1921, when the tanks were approximately 90 ft. high. The floor shown in the right-hand view is a working platform for wheeling and placing concrete which is raised together with the forms. The wall forms are below the working platform and are raised by jacks working on 1-in. steel rods, which are set in the concrete and which are continuous from floor to roof, being spliced with pipe thimbles. These rods carry the weight of the forms and the working platform. The jacks are attached to steel yokes, which are, in turn, bolted to the segments of the wall forms. As before mentioned, all the wall forms are built in one piece and raised together as a single unit.

The walls are 7 in. thick, and horizontal reinforcing varies from 8 to 12 in. centers. The only vertical reinforcing are the 1-in. jack rods on approximately 8-ft. centers, there being about 8 jacks used per tank. The progress made when the shifts were working continuously averaged about 6 ft. 6 in. each 24 hours. The left-hand view shows the movable forms placed on the bin bottom ready for concreting on Oct. 21, 1921. In considering the speed, which is remarkable, account must be taken of the fact that when the tanks reached an elevation of 15 ft. it was necessary to discontinue pouring of walls to place the hopper bottoms in all the tanks. This consisted of a cone-shaped fill of lean concrete (½ barrel to 1 yd.). This fill was placed at a slope of 9 in. on 12 in. to cause the bins to clear themselves when emptying. For the placing of this lean concrete, amounting in all to 3000 yd., one week was required.

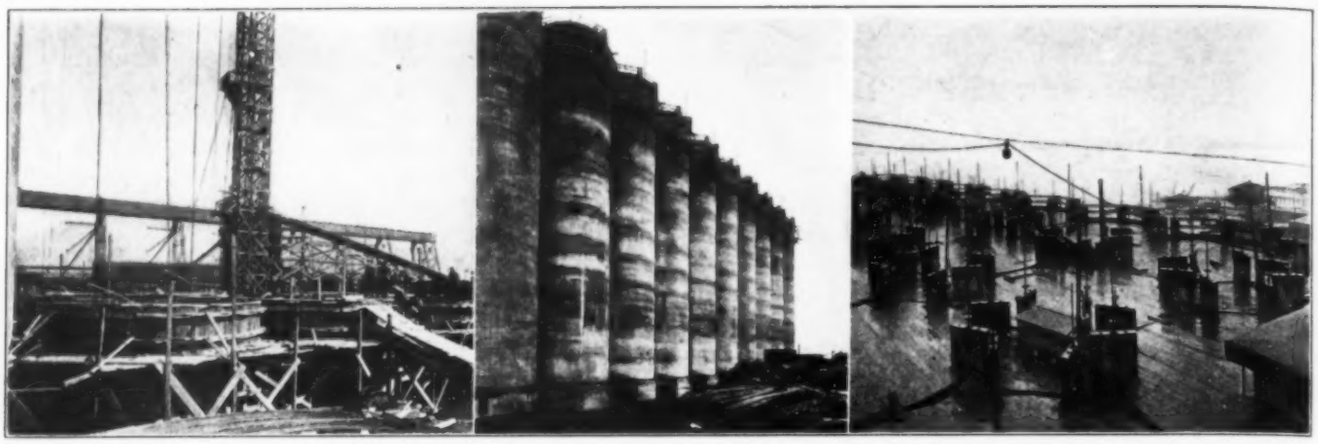
Sand and gravel were brought to the job by scows and unloaded by a derrick operating a clamshell bucket into a receiving hopper. From this hopper material was conveyed on a 24-in. smooth belt, a distance of 225 ft. to the top of the charging bins, which have a capacity of 55 yd. of gravel and 25 yd. of sand. The charging hopper discharges into a proportioner or batch box beneath, in which the proper amount of material is placed. By means of a lever, this batch box dumps direct into a ½-yd. mixer. The batch box or proportioning hopper consists of a box holding 12 cu. ft. of gravel and 6 cu. ft. of sand, and has a drop bottom which is released by a small hand lever operated by one man, who also fills the batch box from the bins above. The drop bottom is arranged with a counterweight which closes it instantly after the discharge of the batch.

Cement was unloaded directly from cars by freight trucks and wheeled to the mixer platform over a runway slightly pitched from car to mixer. One man was able to wheel 8 to 10 sacks of cement at a load. No storage or secondary handling of any kind was done, and, although at one time as many as 3 cars of cement were used in 24 hours, no demurrage on cars occurred. A double 180-ft. wooden tower, one side used for elevating concrete, and the other for a ladder stairway to allow workmen to reach the working platform of bins, was located so that it might be used in connection with the construction of the remaining tanks and workhouse. The two photographs at the bottom of pages 4 and 5 show the arrangement of the plant.

For the first tanks, concrete was elevated and spouted to a floor hopper, from which the concrete



THE CONVEYOR FROM THE WATERSIDE, CHUTING TOWER, AND ARRANGEMENTS FOR UNLOADING THE CEMENT FROM RAILROAD CARS ARE SHOWN IN THIS HALF OF THE PHOTOGRAPH



OCT. 21, 1921 NOV. 14, 1921 NOV. 14, 1921

was wheeled to place by buggies. For the remainder of the work an auxiliary tower will be built which will re-elevate concrete received by spouts from the main mixing plant. The enlarging of the workhouse, a concrete structure 180 ft. high, which contains all the elevating, weighing and cleaning machinery for taking care of the various grades of grain, is being started. This building will contain square storage bins for the first hundred feet, starting 20 ft. above the floor. Above this point it is known as the cupola, which is the ordinary beam or girder type of construction. At the present time Annex 3, before described, is completed. The bin walls for Annex 4, which consist of storage tanks, are up 6 ft. 6 in. and the foundation piles are being driven for the workhouse as well as the gallery extension.

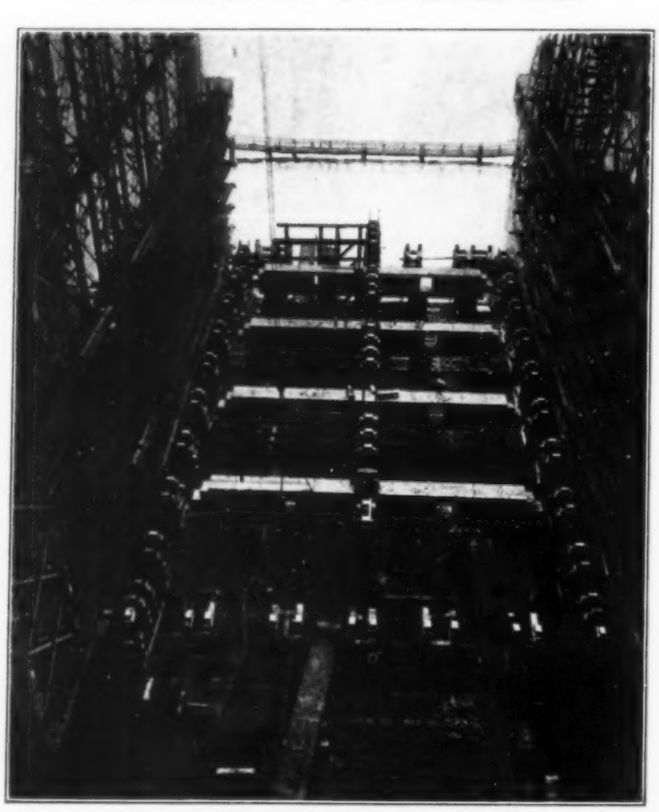
To guard against explosions caused by dust, a sweeping system is being installed which covers the entire plant, with outlets on all floors approximately 50 ft. apart. By this system dust is picked up by suction caused by fans and conveyed through 18-in. galvanized pipes to a dust house, from which it is loaded on cars and shipped away, later to be used in the manufacture of stock food. At the ends and junctions of all conveyor belts, a sheet iron hood is placed over the pulleys, so that all dust which leaves the grain is automatically removed.

The entire plant was designed and is being built by the grain elevator department of the Stewart organization, of which W. R. Sinks is manager. Work will be completed in the summer of 1922. P. C. Metz is superintendent for the contractors.

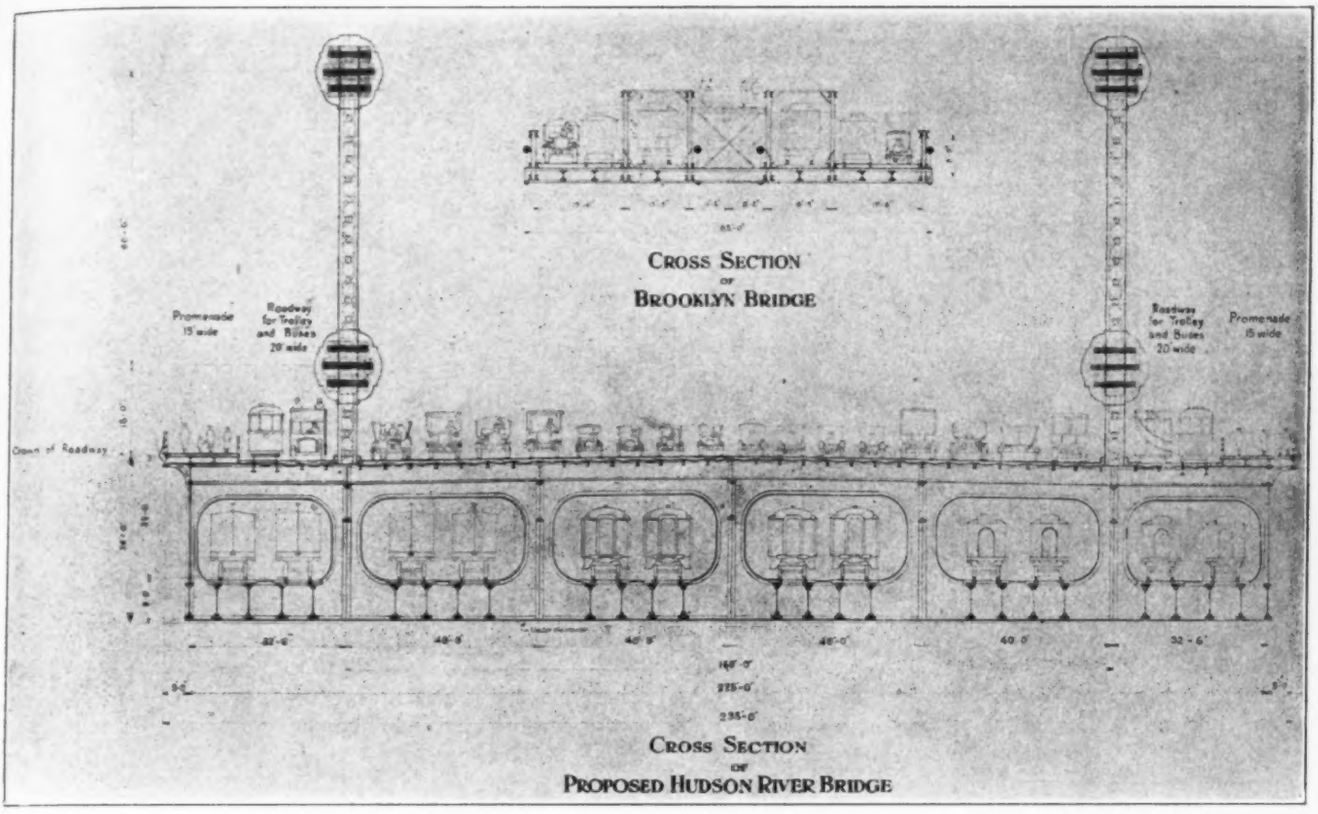
A BOOM IN BIG BRIDGES

AT the present time three of the longest suspension bridges in the world are much talked of, two of which at least have been projected in one form or another for the last 100 years. One, the Delaware River Bridge, connecting Philadelphia and Camden, has actually been commenced. This bridge, which has a main span of 1750 ft., with two side spans of 720 ft. each, or a total of 3536 out to out, is longer than any suspension type bridge now in existence. Its estimated cost is $28,871,000. The main carrying cables consist of two 30-in. steel wire cables. The overall width is about 125 ft. 6 in.

The photograph shows one of the two caissons which are being built at the Camden plant of the New York Shipbuilding Corporation. The picture shows four finished timber bulkheads which will separate the working chamber into five compartments. Each bulkhead is made of 12 by 12 timbers bolted together. These are pierced by openings through which the workmen will pass from one compartment to another as the work progresses under the river. The steel walls and roof of the working chambers later will be erected around and above the bulkheads. Openings through which the workmen will enter the chambers are to be in the steel roof. When the caissons are completed, they will be towed some



CAISSON "B" FOR THE PHILADELPHIA-CAMDEN BRIDGE



CROSS SECTION OF BROOKLYN BRIDGE

CROSS SECTION OF PROPOSED HUDSON RIVER BRIDGE

three miles down the Delaware River to the bridge site at the foot of Race Street. The Keystone Construction Co. and Holbrook, Cabot & Rollins are joint contractors, working under the direction of the Delaware River Joint Commission.

The second is the proposed Bear Mountain-Hudson River suspension bridge which will form a part of the Westchester County and Bear Mountain development. This bridge is to be 1650 ft. between piers and will cross the Hudson River 3½ miles north of Peekskill, from Anthony's Nose to Bear Mountain, connecting the network of roads on both sides of the river. It will be essentially a highway bridge and is estimated to cost about $5,000,000. A bill is now before the Legislature to grant permission for the construction of the bridge with the proviso that it become State property free at the end of thirty years. Terry & Tench Co., Inc., are the engineers and contractors.

The third bridge, which is by far the greatest bridge ever proposed, is still in the embryonic state, and is known as the Hudson River Bridge, which is proposed to span the Hudson River at Fifty-ninth Street. This is also a suspension type having a main span of 3200 ft. with two side spans of 1600 ft. each. The total length of bridge including abutments will be about 7300 ft. The four main carrying cables are made up of eye-bar chains, each consisting of 80 steel eye-bars, the whole encased in a metal protection. The main towers for this bridge are to be 800 ft. above the water line. There will be an underclearance above the water of 150 ft. at the center which will clear the largest boats. The bridge will carry one 155-ft. roadway, allowing 16 lines of vehicular traffic, four rapid transit tracks, and two 17-ft. promenades for pedestrians on the outer deck. The lower deck will carry twelve railroad tracks and conduits for cables and pipe lines. The enormous size of this bridge is apparent when compared with the Brooklyn Bridge, the main span of the proposed Hudson River Bridge being approximately twice that of the Brooklyn Bridge. Gustav Lindenthal is chief engineer of the project.

ILLINOIS BEGINS ROAD TESTS

THE test of the Bates experimental road near Springfield, built by the Division of Highways of that state in 1920-1921, is now under way. The road is about 2 miles in length and includes 63 sections, each section different from the others in thickness, the material of which it is made or in design. A fleet of trucks is engaged in testing the road to destruction, and it is expected that as the loads carried by the trucks are increased, many if not all of the sections will be destroyed. The test probably will be continued for several weeks and may even last several months.

THE ROAD ON THE COVER

THE cover of this issue of SUCCESSFUL METHODS shows one of the concrete roads for which the State of Pennsylvania is becoming justly famous. This particular road is in Northampton County and was built by McArthur Brothers. It is an 18-ft. road.

The Pennsylvania Highway Department, with its record of more than 670 miles of concrete roads built during 1921, and a promise of repeating the performance this year, is recognized as a real leader in highway development. George H. Biles is now in charge of the department.

GETTING MATERIAL OUT OF OPEN-TOP CARS

Bucket Loader Clears String in South Dakota. Portable Belt Conveyor Works Well on Ohio Road Job

UNLOADING open-top cars is often a rather perplexing problem and bids fair to remain so until uniform types of cars are adopted for various purposes.

A rather unusual method of unloading was used last summer by G. W. Humphrey of Aberdeen, S. D., on a 23-mile gravel road job from Highmore to Miller, S. D. He was lucky enough to get the same type of ballast cars for transporting his gravel from a pit about 50 miles from the unloading point. The car ends were left open and each car was loaded by weight with 50 tons of gravel occupying only about 32 to 36 yd. of space. As soon as the loaded train reached the unloading point a ramp which is shown in the small photograph was placed against the end car. This ramp was built of two 12-in. planks doubled, making an incline 14 ft. long with a straightaway on top 6 ft. long.

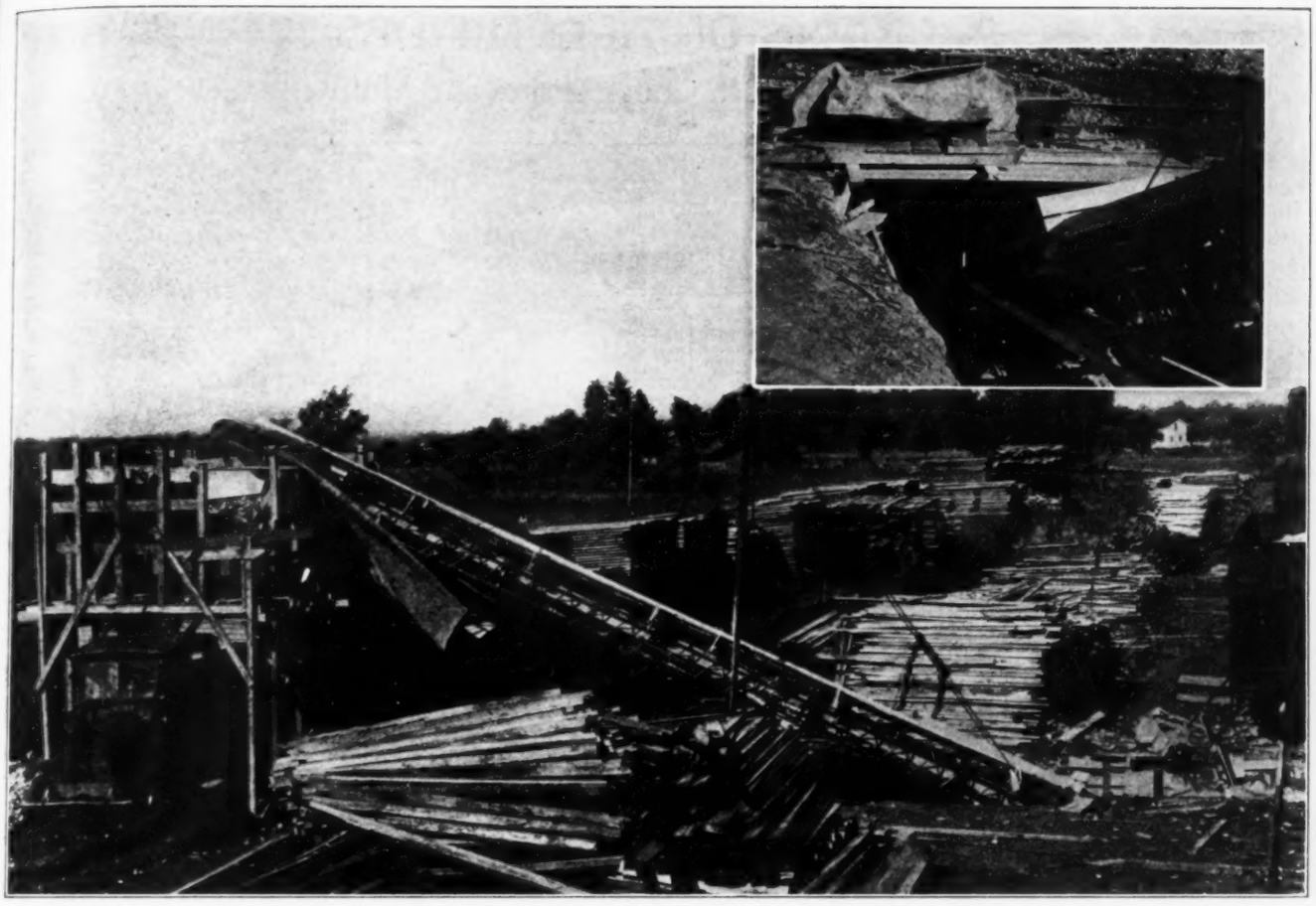
GETTING THE LOADER INTO THE CARS

A bucket loader then climbed the ramp under its own power and started the unloading as soon as it was on the 6-ft. straightaway. A swivel spout made it possible to discharge into wagons on either side of the cars. The bucket loader traveled through the whole string of cars, unloading as it went, and as it was equipped with crawlers, it could pass from one car to another over planks without other support than the planks themselves. At the end of the string of cars the same ramp on which the loader climbed into the first car was used to get it down to earth again.

Wagons and trailers were used, hauling 4 yd. of gravel to each 4-horse team. The actual unloading time for the operation was 1 yd. per minute and the average maintained of 32 yd. unloaded in 37 min., included the time consumed in moving wagons and trailers into place. The work is being done under the supervision of Foreman H. C. Shearer.

An excellent method of unloading dump bottom cars is employed by E. J. Inman of Ashtabula, Ohio, who used a portable belt conveyor for this purpose on a job on the Rome-Morgan road in that state. Slag running from 4 in. to ¼ in. in size was the material handled and it was unloaded by building a track hopper and placing the lower end of the conveyor as shown in the photograph. The operating angle of the conveyor was about 25 deg. and the slag was loaded into trucks at a rate of one car per hour per

LOADING WAGONS AND TRAILERS AT RATE OF ONE YARD PER MINUTE



PORTABLE CONVEYOR UNLOADING DROP-BOTTOM CAR. THE TRACK HOPPER IS SHOWN IN THE INSERT.

10-hr. day. Frequently it unloaded even more than that.

During the progress of this job one move of 5 miles was necessary. The work of setting up the conveyor in its new position including the rebuilding of the track hopper, required only 2 days.

Both these methods of unloading cars are unusual, and they show what can be done by an ingenious contractor as in each case the contractor himself worked out the new material. In other words, Mr. Humphrey of South Dakota and Mr. Inman of Ohio showed that originality is no small part of a contractor's equipment.

ELIMINATING ADVERTISING SIGNS ON HIGHWAYS

THE elimination of advertising signs along highways presents a problem which is receiving serious consideration in nearly every part of the country. Several of the state highway departments have succeeded in getting legislation passed prohibiting the erection of such signs along state highways, and at the last meeting of the American Association of State Highway Officials A. R. Hirst, State Highway Engineer of Wisconsin, read a paper in which he expressed the hope that all advertising billboards and signs would one day disappear from the landscape of all the land. These sentiments were received with approbation by the state highway officials in attendance at the convention.

The fly in the ointment, however, is the inability to regulate the owners of land along the highways. California, for example, prohibits signs on the right-of-ways of highways, and whenever they are found thereon they are immediately removed.

Recently Kings County passed an ordinance prohibiting signs on county roads and has instructed traffic officers to remove all such signs that remain on the road after a certain date. It is expected that the other California counties will follow the example of Kings County.

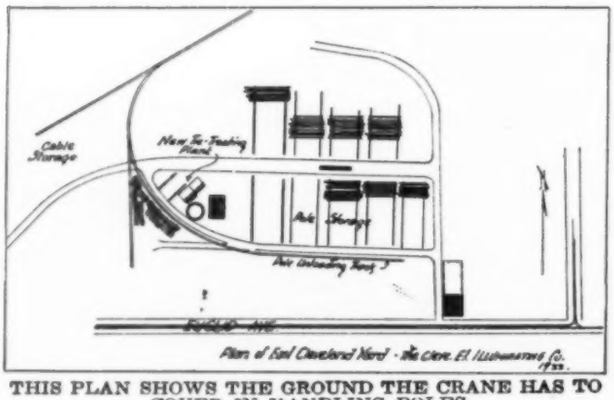
The problem of persuading the owners of abutting property to forego the profits from advertising signs still remains, however, and it will take public sentiment to solve it. One of the few places in which the question has been handled successfully is Fifth Avenue, New York, where the Fifth Avenue Association has succeeded in getting all of the owners of buildings to agree not to use certain types of signs such as brightly illuminated signs, etc.

The big highway associations can do much to eliminate the disfigurement of landscapes by advertising signs if they follow the example of the Fifth Avenue property owners.

A CRANE OF ALL TRADES

Finds Work to Do on Both Construction and Maintenance

IT is not often that a piece of machinery is found which can be used to advantage on all phases of the construction of a new plant and also become a major part of the permanent operating equipment after the construction work is finished. The Cleveland Electric Illuminating Company, however, on the construction of its new pole treating plant and storage yard has done exactly that. A crane mounted on a 5-ton motor truck chassis, as shown in the illustration, and equipped with drums and capstan heads, one on each side for grab bucket work, was used to unload materials, excavate foundations for tanks, erect steel tanks, and when the plant is in operation this same crane will be used to unload poles and rehandle them to the dipping tanks as well as handle the cable reels, fiber conduit and the various other materials which will be stored in the yard.


Cable Storage
New Tie-Treating Plant
Pole Storage
Pole Unloading Track
Plan of East Cleveland Yard - The Cleve. El. Illuminating Co.

THIS PLAN SHOWS THE GROUND THE CRANE HAS TO COVER IN HANDLING POLES

The plant covers 7½ acres and consists of 2 steel dipping tanks 6 ft. by 12 ft. by 12 ft. deep; a 15,000 gal. steel tank for storing creosote; a 50-ft. steel stack, boilers, storage facilities, tracks, etc. For excavating, the crane operated a ½-yd. clamshell bucket equipped with teeth. Material was disposed of by means of motor trucks. The two dipping tanks before mentioned, weighing 6900 lb. each, were received on motor trucks; picked up by the crane and placed in the excavation ready for the concreting of a 12-in. wall around them. The 15,000-gal. creosote tank was made up of sheets weighing about 1500 lb. each and lifted into place by the crane. The 50-ft. steel tank was built on the ground and upended by using a gin-pole and line to the capstan heads of the crane. Numerous other operations, such as shifting cars, unloading a large boiler from a flat car and placing it on its foundations, also were performed by the crane.

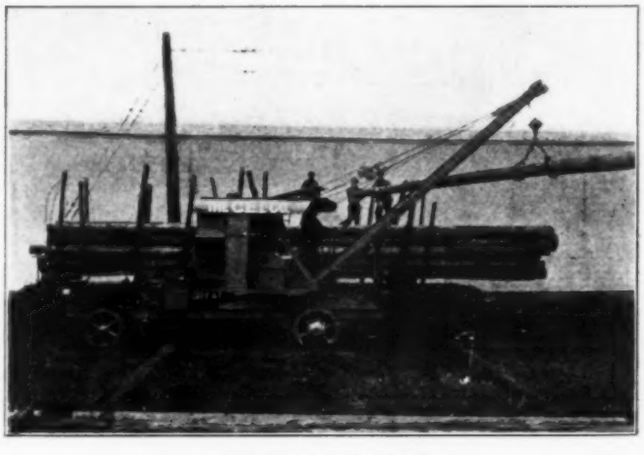
EQUIPPED WITH CLAM SHELL BUCKET

When it is considered that the plant covers 7½ acres, the advantages of the crane's ability to travel from place to place at high speed is readily appreciated, and this feature is of importance when the plant is in operation, as a pole stock of about 3000 is to be maintained from which about 600 poles a month are to be issued. The poles will be stored in piles throughout the yard and the crane used to unload them from cars and place them on their skids, as shown in one of the illustrations. To unload a car of poles (about 60 to a car) by hand it formerly required 6 to 7 hours at a cost of about $31.00. With the help of the crane the time of unloading is cut down to 1 hour and the cost to $5.30, with a considerable saving in the time of the gang moving from place to place. When the poles are ready for treatment they are taken to tanks which have a capacity of 78 poles. After treatment they are lifted out by the crane and placed on end against a platform behind the tanks. The poles vary in length from 25 ft. to 65 ft., the long ones weighing 3000 lb.

About 800 reels of cable are part of the stock. Each reel weighs about 6400 lb. and here again the crane's mobile features enable the heavy reels to be moved about in an economical manner and much faster then could be done in the usual way with a gang of men.

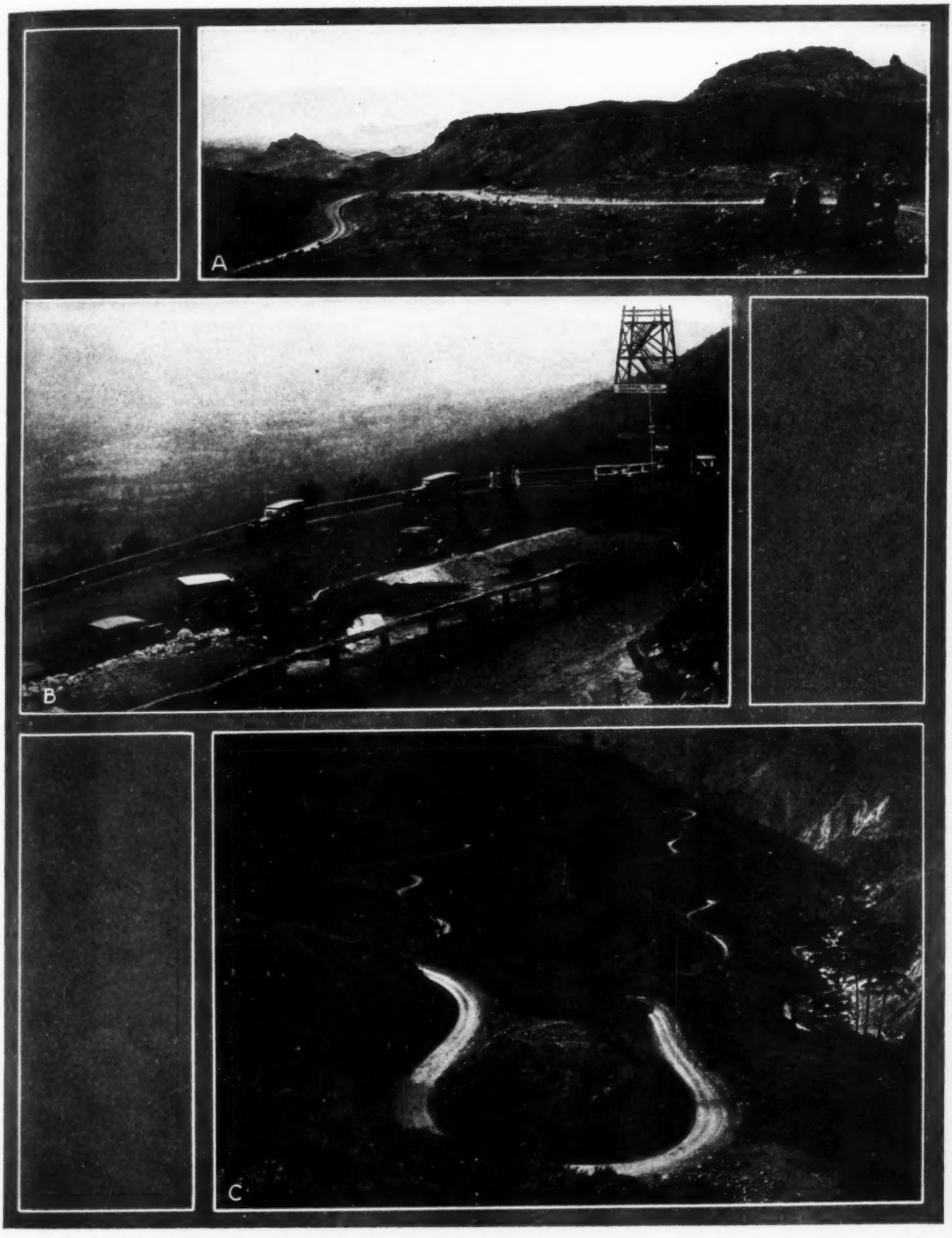
Cars holding fifty tons of cinders were unloaded to ground storage by the crane in an average time of 40 minutes, a job which by hand required 9 men approximately 4 hours to accomplish.

The work was done by the company forces of the Cleveland Electric Illuminating Company.



PICKING UP POLES

Picturesque Highways

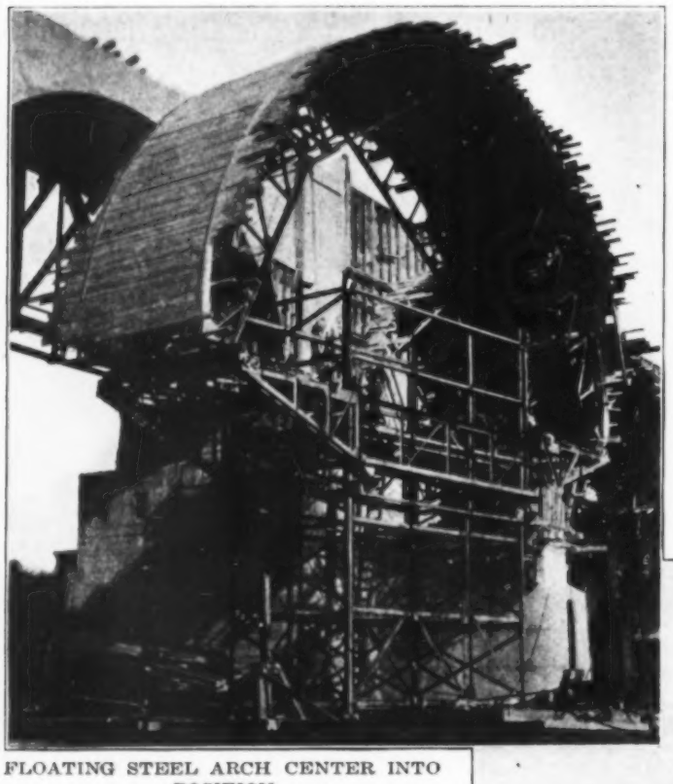


A—Three states meet at this point—California, Arizona and Nevada. © *International*
B—The turn on the famous Mohawk trail in Michigan. © *Keystone*
C—This winding highway is in the Philippines. It is the Benguet road. © *Keystone*

BRIDGING THE SUSQUEHANNA

Barge Carrying Steel Traveler Used in Building of Concrete Arch Structure at Harrisburg, Pa.

A STEEL traveler, mounted on a barge and carrying steel centers is the ingenious and spectacular method used by the James McGraw Company, general contractors of Philadelphia, on the construction of Bridge No. 8, across the Susquehanna River at Harrisburg, Pa. The new structure is part of the Philadelphia & Reading bridge renewal work now in progress at various points. The Harrisburg bridge consists of 46 concrete arches, each span being 66 ft. In order to maintain traffic on the existing steel structure, a part of the new bridge, 13 ft. 9 in. in width, is being built first. After this portion of the work is completed, the track will be shifted over from the old structure to the concrete arches and the remainder of the bridge concreted. This operation, therefore, will require a total of 92 set-ups of the arch ribs, 2 set-ups for each span.

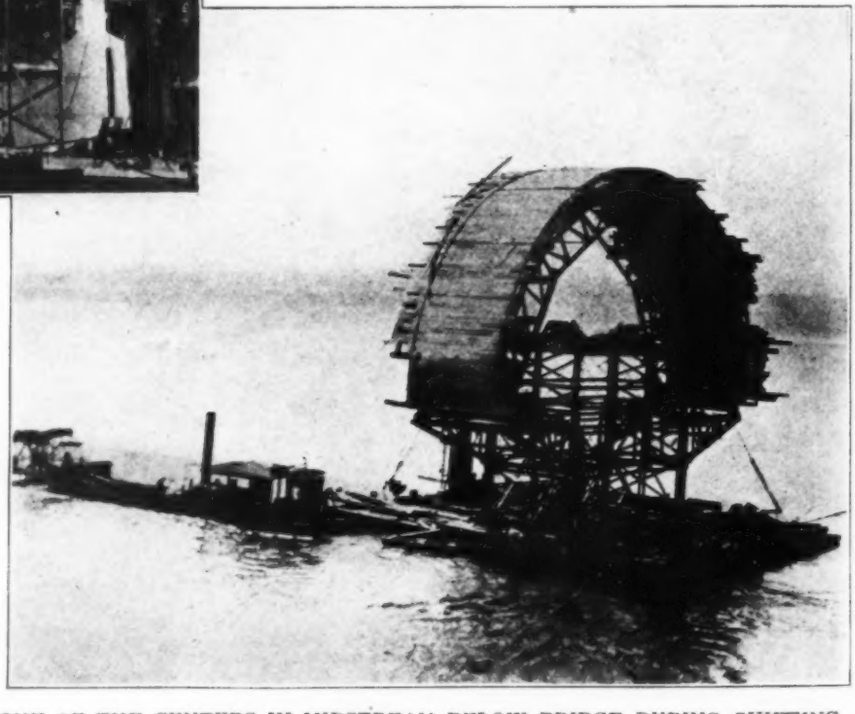


FLOATING STEEL ARCH CENTER INTO POSITION

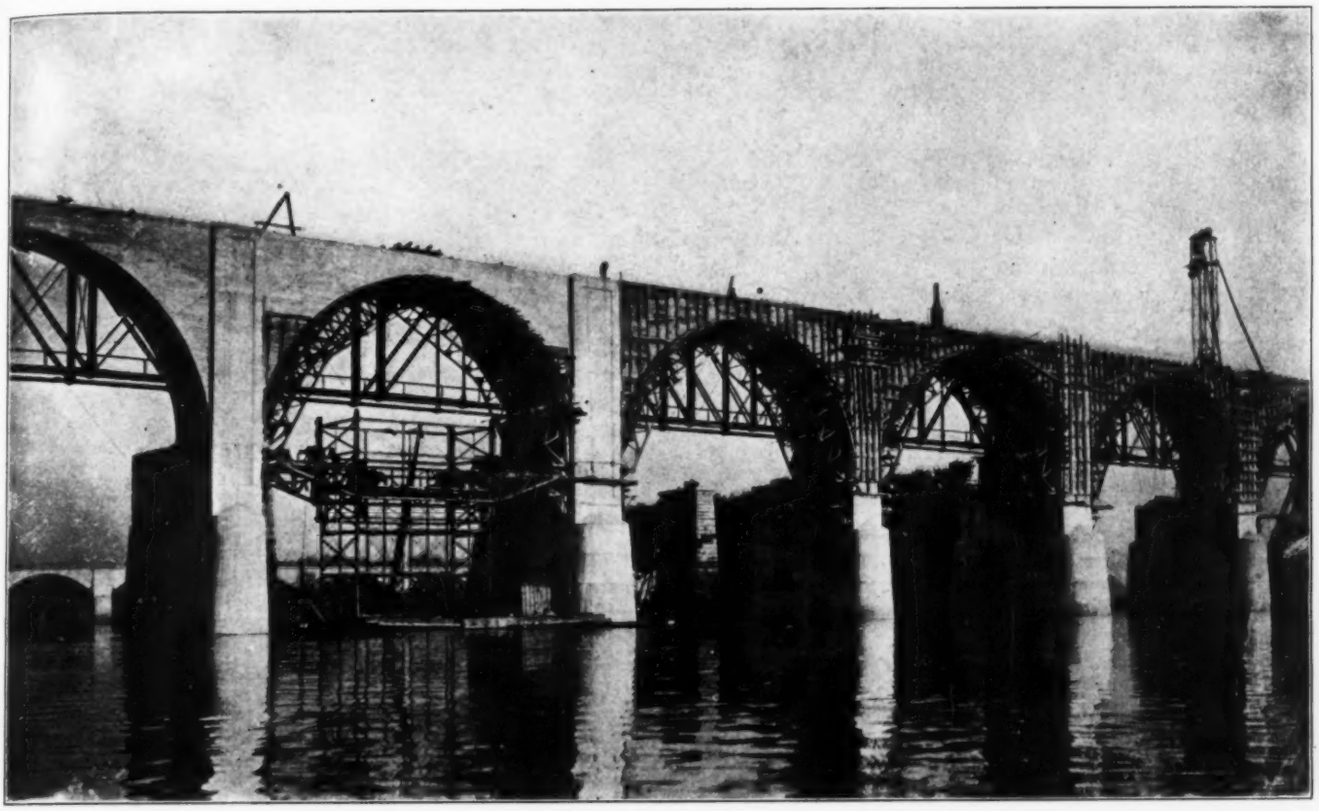
On account of this fact, and also that the bridge is over the water for practically its entire length, it was decided that the most economical and efficient method of handling these centers would be on some type of traveler mounted on a barge. Due to a considerable grade, there is a difference in elevation of the spring line of approximately 24 ft. from one end of the bridge to the other. It, therefore, was necessary to design a traveler having one fixed part and two sliding parts. This feature of the traveler allows it to pass under the centers at the low end and still be able to reach the centers at the high end.

For placing the centers, the traveler is towed underneath and the sliding frames are raised up until they engage the heel of the steel ribs. The centers are raised and lowered by means of worm-geared safety winches. This type of winch was adopted in order to avoid any possible accident due to the dogs being accidentally displaced or the possibility of the load getting away from the man operating the winches. When it is desired to move the centers, they are pulled in horizontally by means of ratchets and lowered by means of the worm safety winches and are towed to the next span, when the operation is repeated.

For handling the concrete a single narrow-gage track, carried on cantilevered supports from the upper part of the present structure, is supplied by a 1-yd. mixer plant with tower at each end of the bridge. A derrick boat in the river handles the forms and reinforcing steel. At the present time all foundations and piers are completed. The first operation of the arch work will be completed in the early part of this summer. Upon completion of this part, the old bridge will be removed and the additional arches will be built. The design was made by the Philadelphia & Reading Railway. Both design and construction are under the direction of S. T. Wagner, chief engineer.



ONE OF THE CENTERS IN MIDSTREAM BELOW BRIDGE DURING SHIFTING OPERATION



FIVE OF THE BIG ARCHES ON THE HARRISBURG BRIDGE IN VARIOUS STAGES OF CONSTRUCTION

CORRECT LUBRICATION MEANS MONEY SAVED

IN the operation of engineering machinery, especially contractors' equipment, the question of proper lubrication is one that frequently does not receive the consideration that it deserves. Operators often fail to appreciate that every moving part of their equipment must have an oil film to obtain proper lubrication and that the character and reliability of this oil film will be a measure of the life and efficiency of each particular piece of equipment.

In general, when sufficient feed water is lacking, which is usually the case on construction work where water is sometimes used over and over again, it is advisable to reduce cylinder oil feeds to a minimum. By so doing, not only a saving of oil takes place, but the scale caused by the cylinder oil in the boiler is greatly reduced. Of course, cylinder oil feed must be regulated with discretion. This may be done by reducing the feed until the valve stems begin to chatter or the cylinder begins to groan, which is an evidence that an insufficient quantity is being introduced into the cylinder. By slightly increasing the feed until the chatter and groan cease, the correct amount of cylinder oil may be determined.

Bearings, including both engine and machine bearings that are hand oiled, should receive attention at least twice a day. If drop feed oilers are provided, the operator, of course, should open them the first thing in the morning and shut them off at night to save oil. Obviously, oilers should be kept filled with oil at all times. In the case of electrically driven equipment, motor bearings, which are in the majority of cases lubricated by ring oil bearings, require the use of a light-bodied oil. This is easily understood when journal speeds of the motor are considered. Cleansing of motor bearings of all dust and grit should take place at least four times a year, when the oil should be replenished. This should give satisfactory lubrication of the motor.

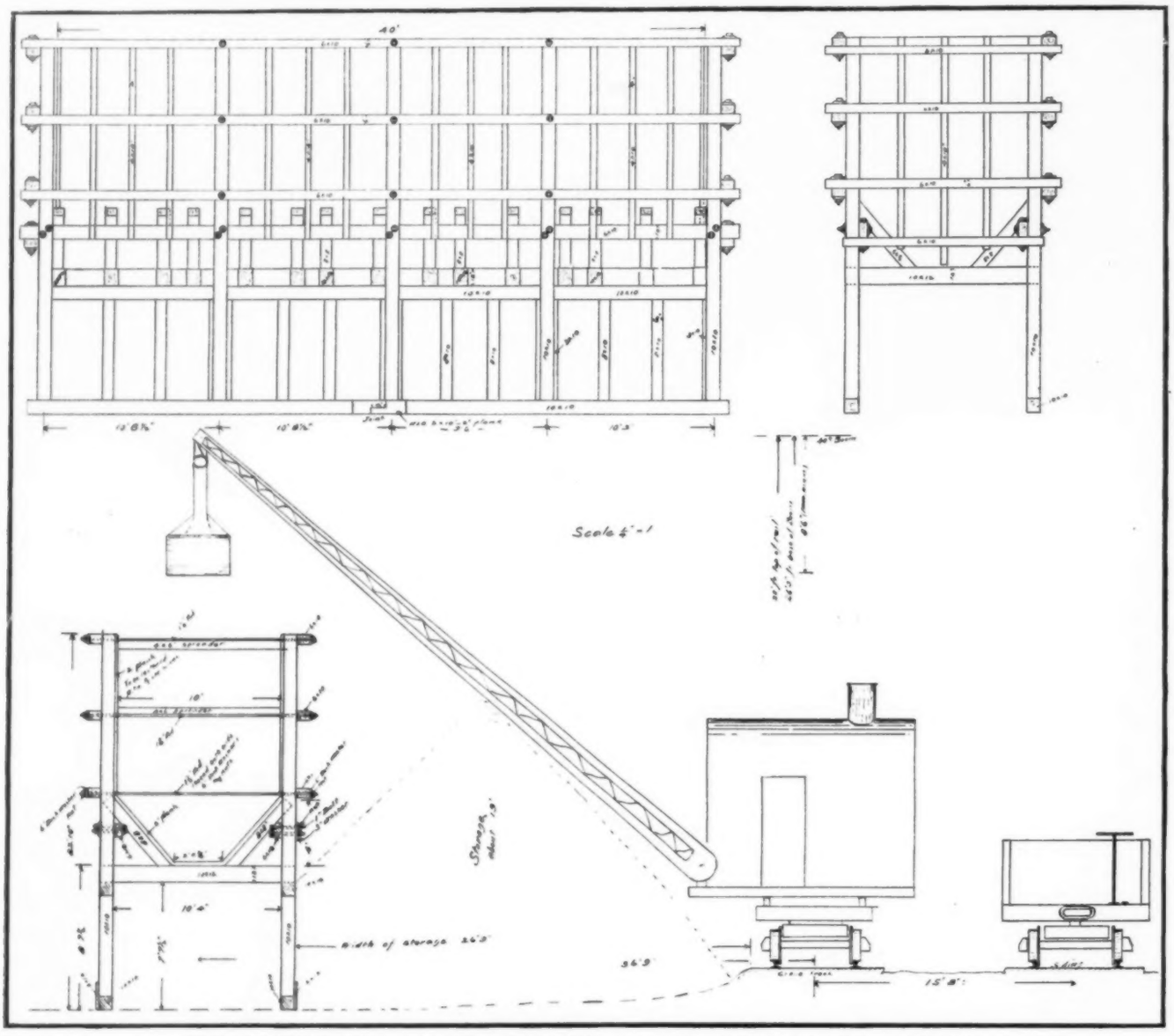
Cables and chains are a part of the equipment which as a rule receive too little attention from plant operators. Chains and cables will rapidly corrode and wear out if they are not kept properly lubricated. This means that the cable core as well as the individual strands and the chain links must be properly oiled to obtain the maximum service. The lubrication should be applied hot and swabbed with a brush or paddle if possible, or the cable should be completely immersed in the lubricant itself, allowing, of course, the excess oil or lubricant to drop into a container to prevent waste. In general, a heavy viscous oil with an asphaltic or paraffin base is best for chains and cables.

There is a commercial value in keeping a machine properly lubricated that is sometimes overlooked. Contractors often would like to exchange a piece of equipment for something more suitable, but owing to the condition of the machine little or nothing can be allowed. At this season of the year, especially, a contractor might well give thought to the proper lubrication of his plant, either idle or stored.

A WELL ARRANGED MATERIAL YARD

Careful Planning Forestalls Delays on New Jersey Road Job

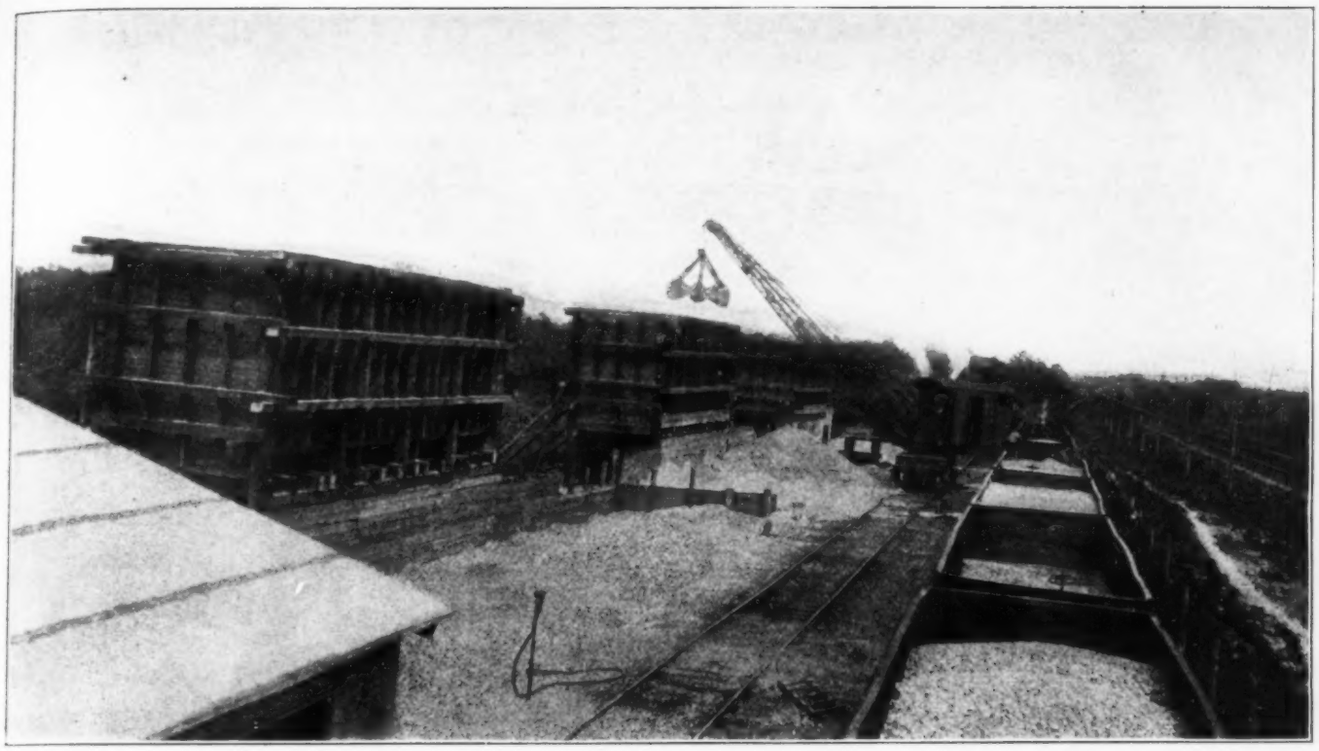
A MATERIAL yard layout, designed with unusual care, the main idea being to forestall any delays due to irregular shipments, was that used by the Standard Bitulithic Company on their Pleasantville-Mays Landing road job in Atlantic County, New Jersey. The road consists of 8 miles of 20-ft. bitulithic track and the bins was planned to give a maximum storage capacity with a minimum amount of moves for the crane. Sheathing was placed alongside the bins to give greater storage. Industrial track was built underneath the storage bins, which track, as well as bins, was laid to a definitely established grade



THE CONSTRUCTION OF THE BINS IS WELL ILLUSTRATED BY THIS DIAGRAM

surface on a 6-in. concrete base and was completed last season. Before deciding on the layout to be used, a careful survey of the proposed site was made and levels taken. After a study of traffic conditions, it was decided to build a yard with sufficient capacity so that irregular shipments would not cause a shutdown of the work.

The Pennsylvania Railroad installed both the storage track and the crane track. Two bins of 280-cu.-yd. capacity are for gravel and a third of the same capacity for sand. The storage space between the crane line. A cement shed placed between this track and the crane track, with a floor at the box car floor level, so built that cement was trucked on platform trucks either to storage or to the batch boxes on industrial cars direct, was used. One of the illustrations shows the yard layout. Originally each bin was equipped with 10 chutes for charging the batch boxes. Later, 2 more chutes were added to each bin. The bins were so constructed that they could be knocked down and re-erected with a minimum of trouble. Bolts and lag screws were used instead of nails and the panels are



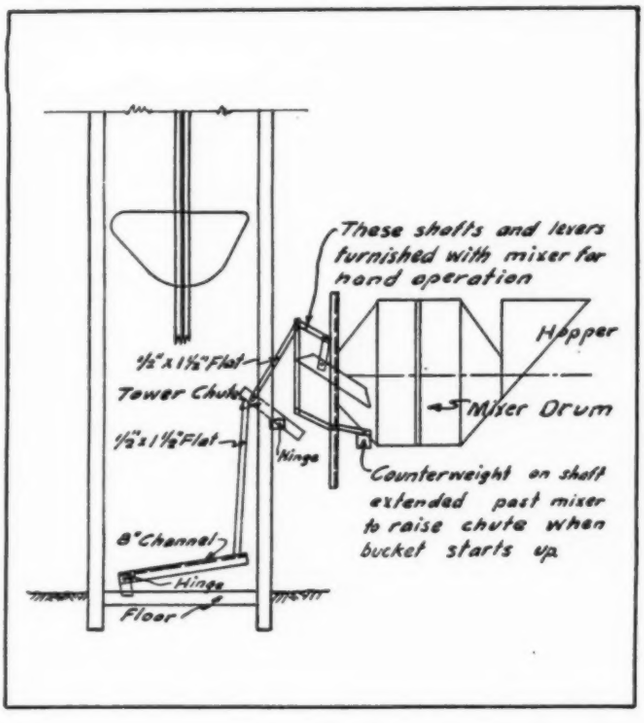
uniform. Another illustration gives a detail of the bin, as well as the cross-section through the yard.

For transporting the material, 12-car trains of 24 batches each were used. Grades were flat, the maximum being about 1½ per cent. Eleven minutes were required for loading the train, which included the entering and leaving of the yard. One 21-E paver was used, and no delays were caused by lack of material. With the assurance that there would be no interruption in the flow of materials to the job, the material layout would be sufficient to serve 2 mixing units similar to the one used.

The material yard is located at McKee City, N. J., and 1 mile of dead haul is necessary before reaching the work. For this mile, the industrial track runs down the roadside and intersects the Pleasantville-Mays Landing road at a point 5 miles from the Mays Landing end and 3 miles from the Pleasantville end. The best day's run was 540 lin. ft., or 1200 sq. yd. of 6-in. concrete base.

DISCHARGE AND TOWER CHUTES OPERATED BY BUCKET

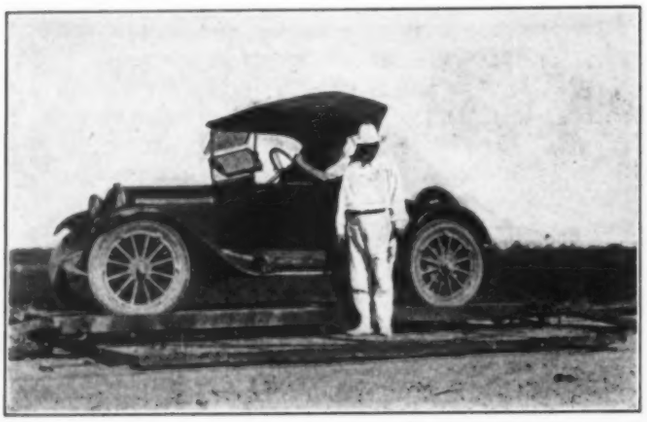
A DEVICE for operating the discharge chute of the concrete mixer by means of the elevator bucket is illustrated in the accompanying sketch. As the bucket descends it comes in contact with a channel iron hinged at the bottom of the tower. A 1½ in. by ½ in. steel flat connects this channel iron to the tower chute by which the tower chute is tilted. Another flat used in connection with the shafts and levers which are furnished with the mixer for hand operation pulls down the discharge chute of the mixer. When the bucket is raised, a counterweight raises the chutes to allow the elevator bucket to pass. Should the batch not be ready when the bucket is descending, the hoisting engineer merely holds the bucket until the batch is ready. The Terry & Tench Company, general contractors, New York City, have used this arrangement successfully on several jobs.



This device saves the time of the man who ordinarily controls the discharge chute. The elevator bucket is raised and lowered in a vertical line without its course being diverted at the bottom of the tower back toward the mixer.

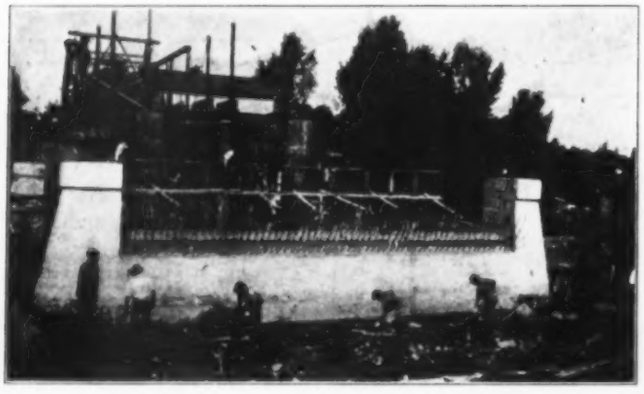
ONE-MAN TURNTABLE FOR MOTORISTS

IT'S a long lane and it has no turning—therefore, the contractors who are working on an Arkansas road job have thoughtfully provided a one-man turntable for the convenience of the motorist which permits him to about face on the narrow road.



SPEED COUNTS IN BRIDGE BUILDING

THE building of bridges is one phase of highway work in which speed of construction is necessary. The best sort of road is a useless thing if there is a gap somewhere along the line caused by delay in completing a new bridge. It is easy to detour around an unfinished section of pavement, but flying across a stream is a very different proposition.

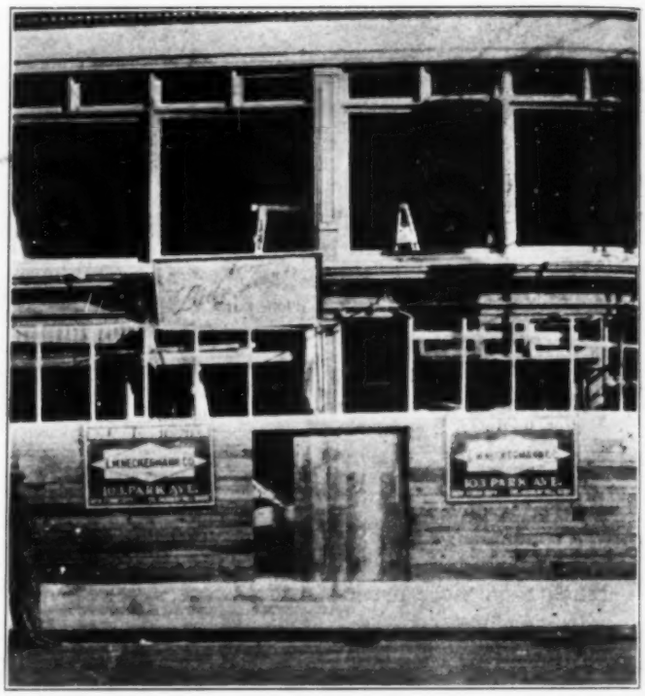


The photograph shows work in progress on a three-arch concrete highway bridge at Flushing, Mich., which was started Aug. 1, 1921, and finished on Dec. 1 Smith & Nichols, contractors, of Hastings, Mich., who specialize in concrete bridges, did this job.

TURNING THE WINTER INTO PROFITS

AS an off-season vocation for turning a severe winter into a profit, the remodeling of old buildings to meet present-day requirements offers many advantages to the contractor.

On Broadway, New York, near 110th Street, the L. M. Neckerman Company has recently completed for the Trianon Restaurant Company, the remodeling of an old 2-story structure into a handsome restaurant representing an expenditure of $100,000. The work included the entire alteration of two floors and basement, as well as the front of the building. A view of the completed exterior shows the architectural



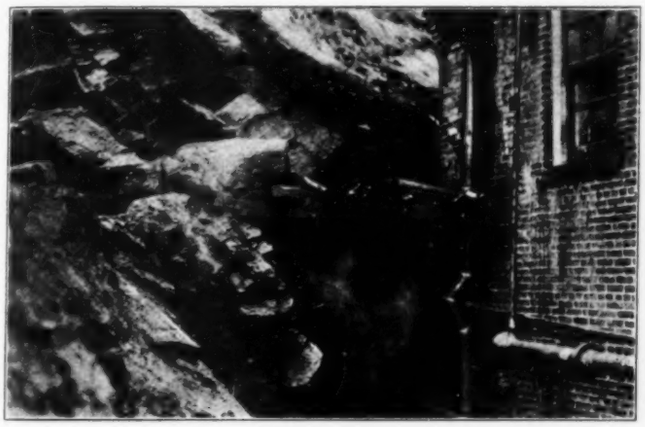
treatment of the building. The stucco covering is especially attractive and was mixed and applied in a rather novel manner. Plasterers, using a mixture of white sand, Cow Bay sand and white cement, gave a pleasing imitation of the stone of the cathedrals of Caen, France.

Although work was started and completed in the winter months, not a single day was lost owing to weather conditions, and 15 different trades were represented. The general contractor is now finished and free to go on outside operations. J. B. Pattenaude is superintendent for the contractors.

A DELICATE BLASTING JOB

"BE sure you're safe, then go ahead," might well be the 1922 revision of Davy Crockett's motto —at least on construction work. A. S. Renza, president of the Peekskill Construction Company of Peeks-

kill, N. Y., believes in that motto to such an extent that he was willing to risk a $50,000 bond on his belief that his method of excavating 5000 yd. of rock



would not injure or damage in any way the buildings of the Fleischmann Yeast Company which are immediately adjacent. The upper photograph shows the character of the rock taken out.

Solid rock was taken out from about the elevation of the roof of the building shown in the lower illustration down to the basement level. In the shooting of the rock, and in fact the handling of the 5000 yd., not so much as a window was broken nor any part of the rather intricate piping system damaged. Mats made up of wire rope, weighted down with logs confined the rock and muffled the explosions. The rock was loaded into skips and dumped into motor trucks with a derrick. Sixty days were required for the job and the work was done under the personal supervision of A. S. Renza.

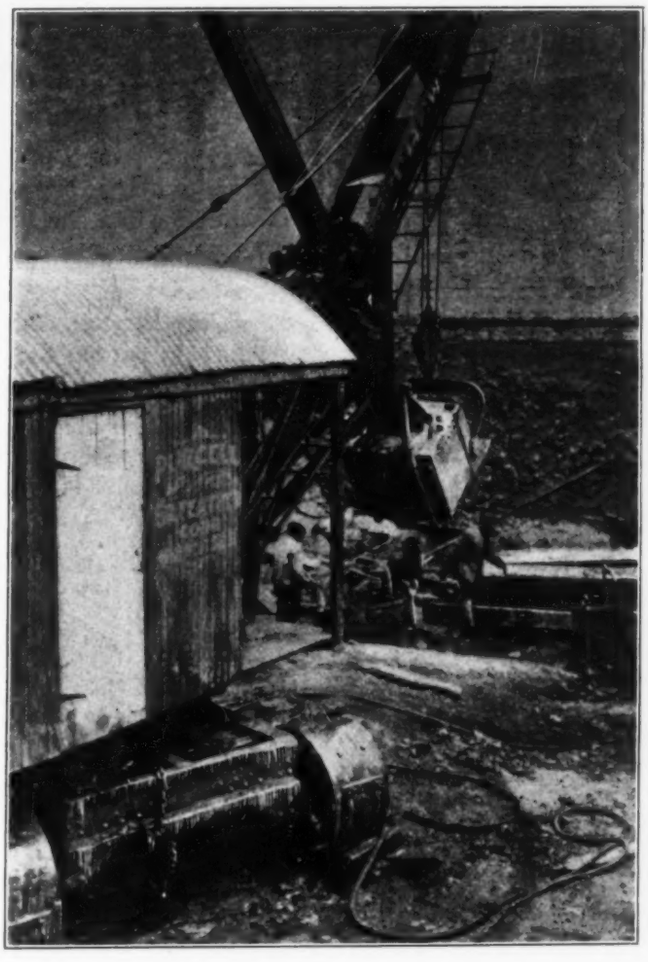
INSTRUCTIONS FOR EMPLOYEES

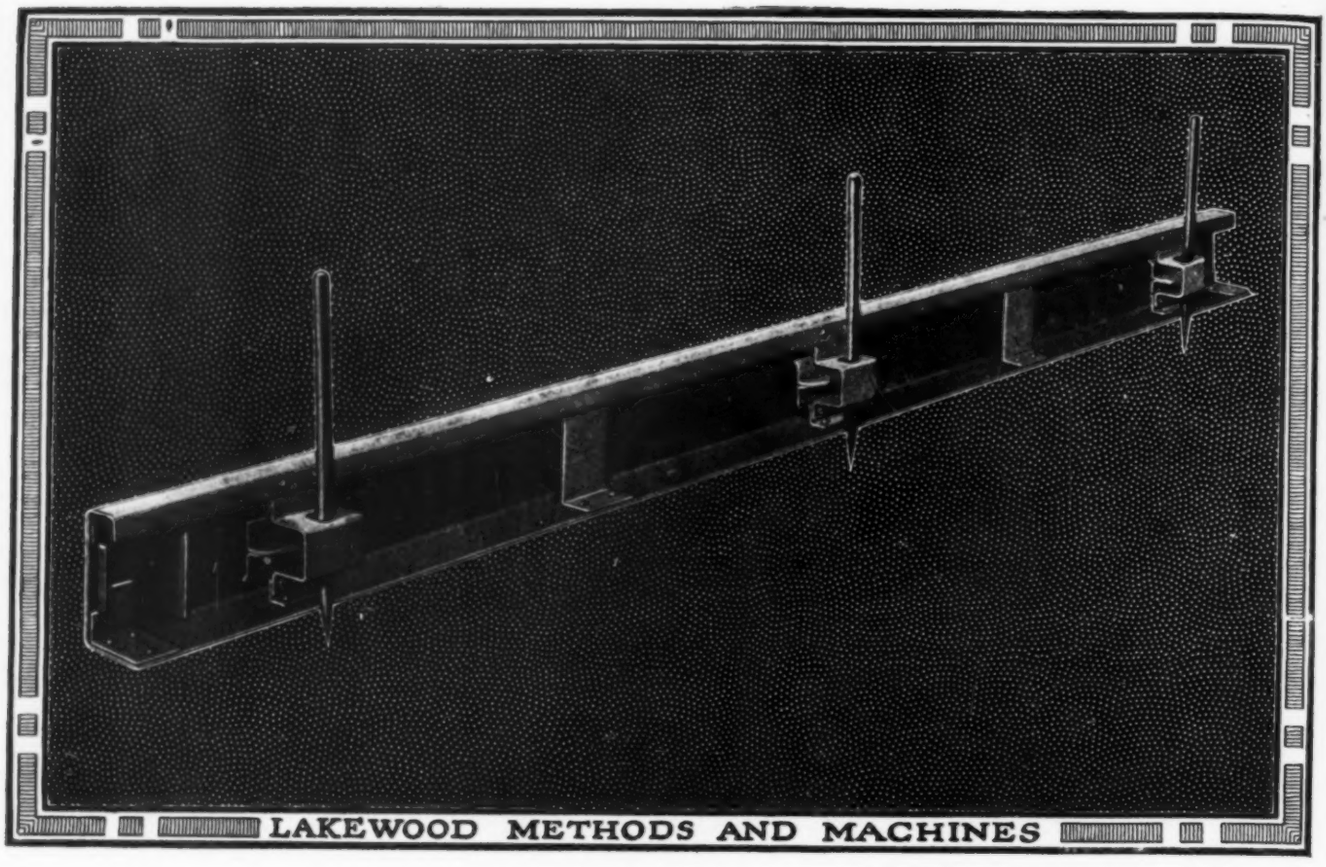
KEEPING accurate records is an important factor in the contracting business and Villadsen Brothers of Salt Lake City, Utah, have recognized this fact so clearly that they have issued two instruction books on the subject for the use of their employees. In addition to their standard instruction book, they have had printed a 6-page pamphlet which contains instructions for use only for the first eight days after a man assumes clerical duties. The following paragraph shows the untechnical, and understandable language in which the instructions in this book are phrased:

"The payment of all the company's money depends on the accuracy of the clerical work. A bull on the records means a possible bull in a payment. If it is in our favor the payee objects and has it corrected. If it is against us, we can probably pocket the loss. It follows that the principal object of all our records is to avoid loss of money. Besides that we need the information contained in the records for various purposes. Some of our most experienced and most intelligent men have lost money for us by incorrect records."

WORKING IN CLOSE QUARTERS

THIS shovel, which is at work in a narrow lot on Fifth Avenue, New York, near Seventy-second Street, is crowded up against a wall, but manages to get its job done in satisfactory fashion. There are but a few inches clearance at the rear of the shovel. This picture illustrates the adaptability of a full circle swing shovel in extremely close quarters. Icicles shown on the frame of the shovel show that the weather is below the freezing point.



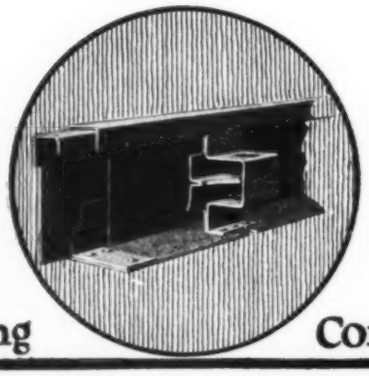


Lakewood Road Forms Cost More to Make But Less to Buy

Each 10 ft. section of Lakewood-Hotchkiss forms has the top flange supported at *five* points. The top is "true as a die" and strong as a bridge.

In many other ways Lakewood-Hotchkiss forms are *better* steel forms—the stake clamps, wide bottom flange, the deep turn-down section of the top, the spot-welding on the top flange. Though they cost more to make, they cost less to buy.

Ask for a copy of Bulletin No. 36.



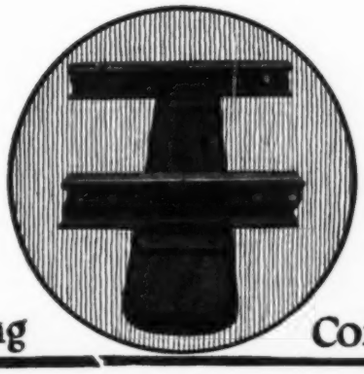
The Lakewood Engineering Company, Cleveland U.S.A.

It Costs Less to Haul Batches with Lakewood Cars

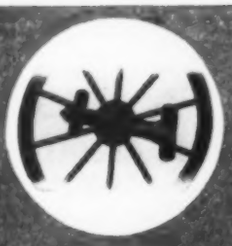
The drawbar pull required to haul a string of Lakewood Batch Box Cars is reduced to the minimum by the use of roller bearings. That means lower hauling costs, and longer service without bearing replacement.

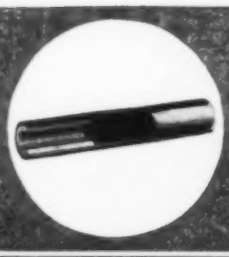
Lakewood tip-over steel batch boxes are made with separate, water tight, removable cement compartments. In actual service complete batches have stood on the job over night with no damage to the cement. It costs you less to haul in Lakewood Batch Box Cars.

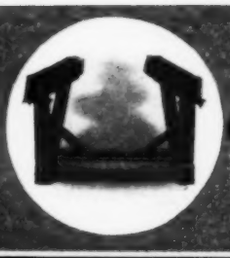
Ask for the Road Plant Booklet



The Lakewood Engineering Company, Cleveland U.S.A.


10 Spoke Wheel


Self Lubricating Bearings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ALMACO ALLIED MACHINERY COMPANY OF AMERICA ALMACO

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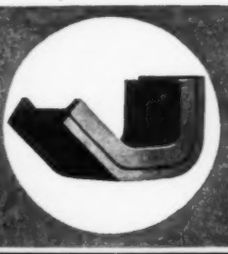
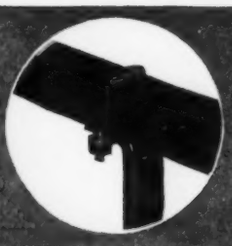


Handle Clamps



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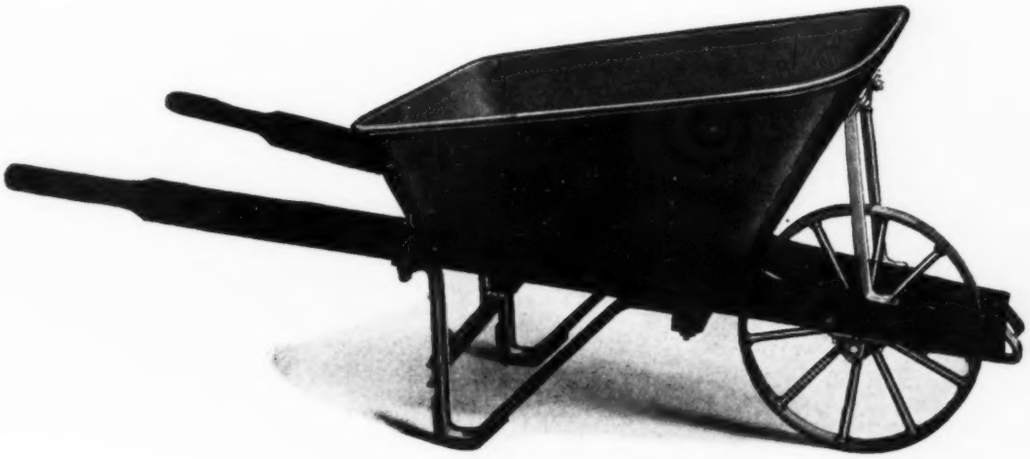

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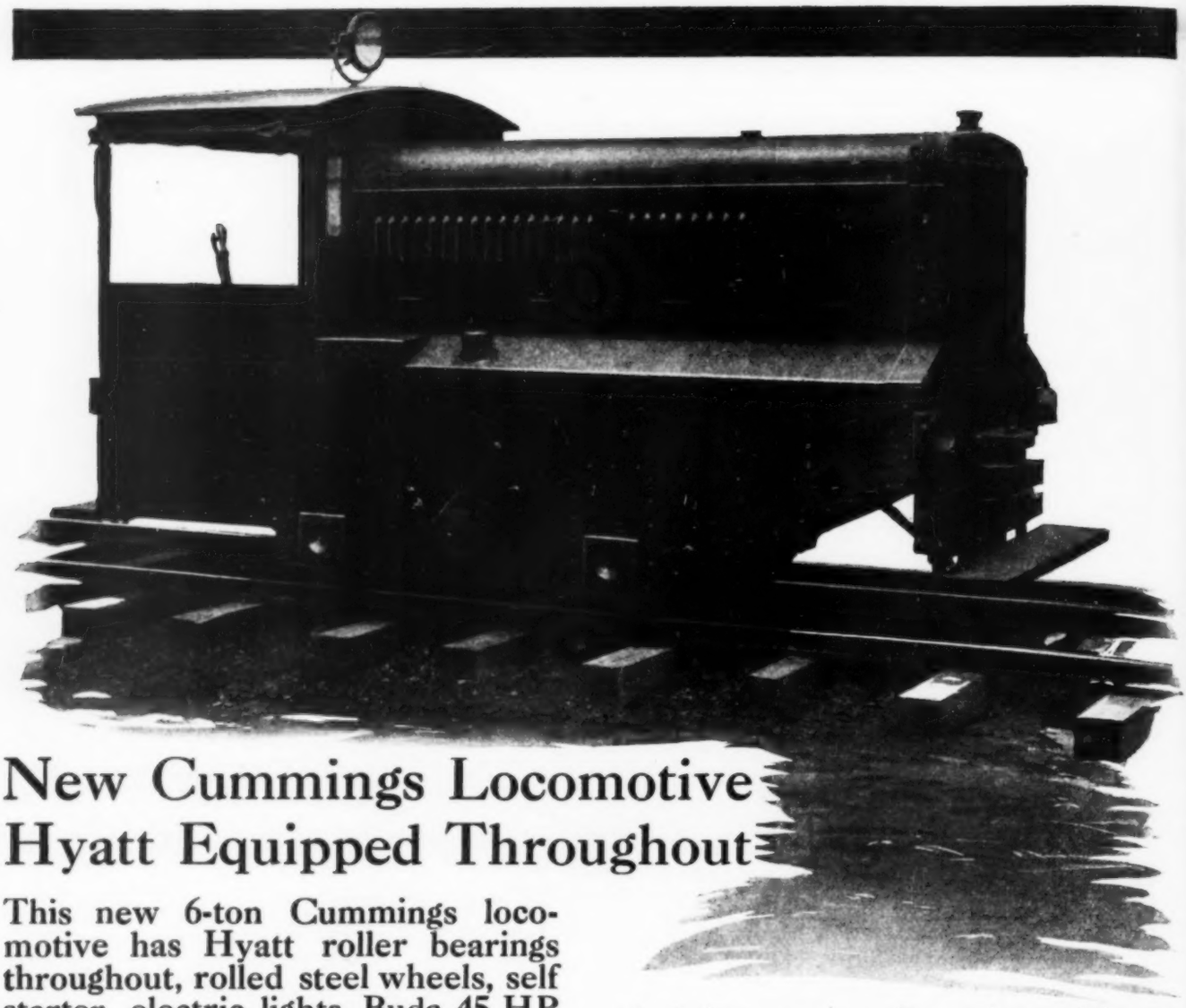


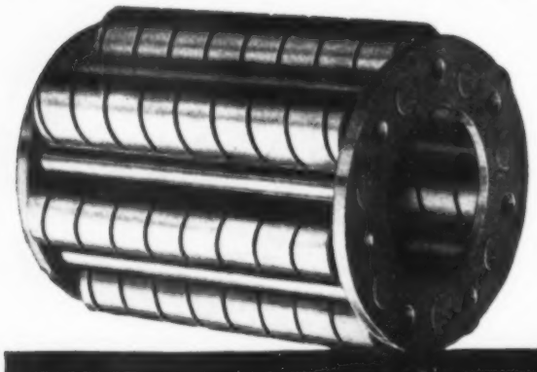
New Cummings Locomotive Hyatt Equipped Throughout

This new 6-ton Cummings locomotive has Hyatt roller bearings throughout, rolled steel wheels, self starter, electric lights, Buda 45 HP engine, brake drums on jack shaft and hollow frame construction, permitting uniform loading of all four wheels.

The use of Hyatt roller bearings on these up-to-date locomotives insures dependable haulage units with minimum gasoline consumption, capable of giving years of service without bearing adjustments or replacements.

Good equipment pays for itself in a very short time through the elimination of breakdowns and the delays that eat into profits.

To help safeguard your profits on every contract, specify that your locomotives, cars and mixers be Hyatt roller bearing equipped.



USE HYATT BEARINGS ON YOUR LINE SHAFTS TOO BULLETIN 125

Hyatt Roller Bearing Co.
Industrial Bearings Division
New York, N. Y.

Motor Bearings Division, Detroit
Tractor Bearings Division, Chicago
Pacific Coast Division, San Francisco

GOODBYE UNCERTAINTY!!

Here is a new trademark; a symbol of unequaled service to road builders —"The Austin-Western Line; It Serves You Right." Wherever you see it remember that it is both the guarantee and the pledge of the oldest and largest manufacturers of road building equipment. Words in themselves don't amount to much, so look beyond these to see what there is to back them up, and you will find:—

Austin

- Motor Rollers
- Steam Rollers
- Rock Crushers
- Reversible Graders
- Elevating Graders
- Road Scarifiers
- Motor Sweepers
- Street Sweepers
- Street Sprinklers
- Road Oilers
- Dump Wagons
- Culverts

Western

- Rock Crushers
- Reversible Graders
- Elevating Graders
- Dump Wagons
- Road Planers
- Road Scarifiers
- Road Drags
- Wheeled Scrapers
- Drag Scrapers
- Road Plows
- Ditchers
- Screening Plants

Factories equipped with everything needed to turn out machines of the highest quality at rock bottom prices.

The largest and most complete line on the market.

Branch warehouses and service stations scattered all over the country, insuring prompt shipment of both machines and repairs.

A sales force of experts qualified to help you solve your most difficult problems.

A spirit of eagerness all through the organization—factories, office and sales forces—to carry out all that can possibly be meant by the words of our guarantee.

"It Serves You Right"

The Austin-Western Road Machinery Co.

CHICAGO, ILLINOIS

Branch Warehouses and Service Stations:

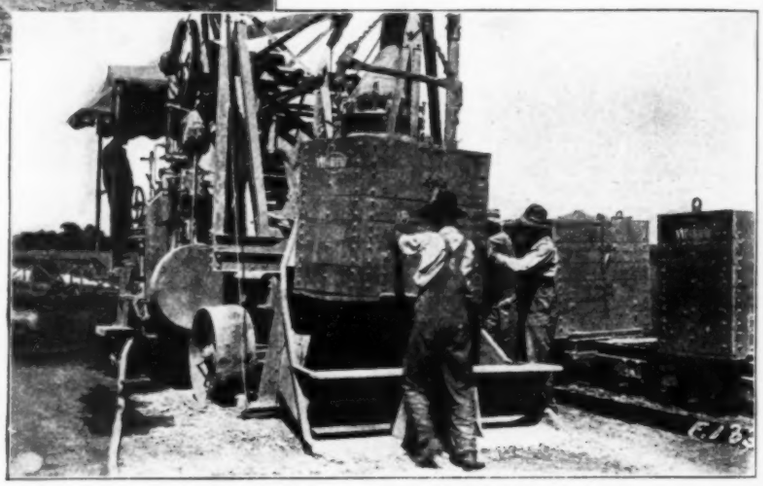
Albany	Dallas	Kansas City, Mo.	Nashville	Philadelphia	San Francisco
Atlanta	Denver	Little Rock	New Orleans	Portland, Ore.	St. Paul
Billings	Fargo	Los Angeles	New York City	Richmond	Wahoo, Neb.
Columbus	Jackson, Miss.	Louisville	Oklahoma City	Salt Lake City	

EXPORT DEPARTMENT
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA

All-Western Installations

This Western Tractor Elevating Grader loading Western Dump-Wagons handled 25,000 cubic yards a month.

One man is handling this Western bottom-dump Batch-Box.



Western

That's Why

AN ALL-WESTERN installation will be to your advantage on that road job. Let Western equipment handle your entire contract, both grading and surfacing.

Strength and low-cost of upkeep characterize all Western equipment. Less than $3.00 apiece a year is what it costs a North Carolina contractor for repairs on his 80 Western wheelers, after years of service. Recently we undertook to determine the breaking point of the popular Western No. 5 plow and the PLOW STALLED THE TRACTOR AT 6,000 POUNDS, drawbar pull.

For nearly 50 years Western small grading tools—plows and scrapers of all kinds—have been building the roads of America.

For long hauls, Western Dump Wagons, operated with a Western Elevating Grader and Wagon Loader, are a money-making installation. Western elevating graders are strong enough for use with a powerful tractor. Western Dump Wagons are strong, yet easy on the team—the only wagon, we are told, that will stand up under a large steamshovel.

For concrete surfacing nothing ordinarily will yield the contractor a greater profit than a Western installation of bottom-dump batch-boxes and road-builders trucks, with industrial haulage. Whatever the type of road, our experienced engineers will be glad to analyze your contract and suggest the most economical installation and layout.

WRITE TODAY.

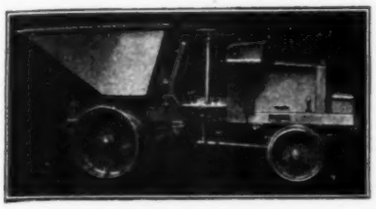
WESTERN WHEELED SCRAPER CO.

EARTH AND STONE HANDLING EQUIPMENT

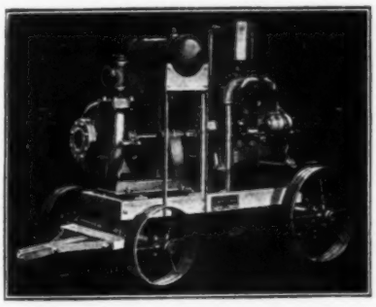
AURORA, ILLINOIS

C.H.&E.

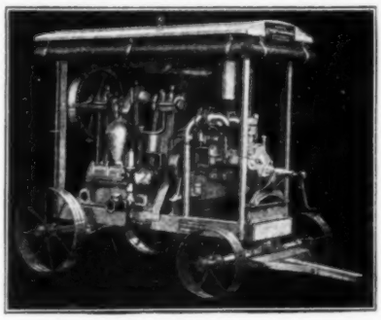
Contractors' Equipment



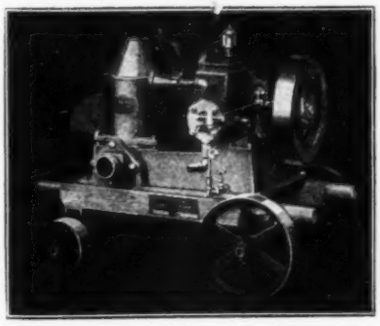
C. H. & E. Tractor



C. H. & E. Centrifugal Pump



C. H. & E. Triplex Pump



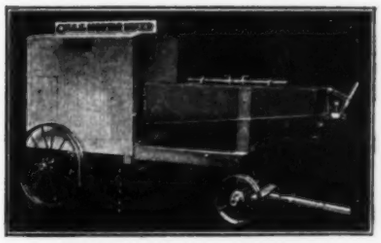
C. H. & E. Bilge Pump

WHEREVER you go on small or large jobs you find one or more CH&E outfits in operation. In excavation or trench work you find a Trench Pump busy pumping water; in road building you find a Triplex Pump forcing water to the mixer; in sawing form lumber and house building, you find a Portable Saw Rig; in hoisting work an electric or gasoline engine driven Hoist, Double Cage Material Elevator; in mixing mortar, a CH&E Mortar Mixer will save you lime, and high labor expense. Our Tractor for road work or industrial work will help you. You should have one of our new catalogs just off the press.

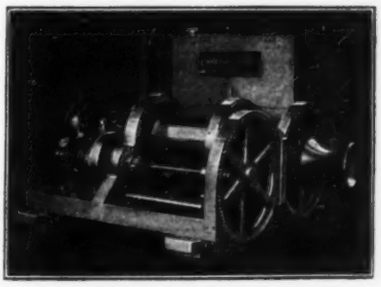
WRITE TODAY.

EXPORT DEPARTMENT
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA

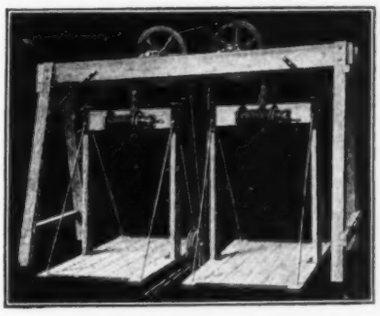
C. H. & E. Manufacturing Co.
384-A Clinton Street,
Milwaukee, Wis.



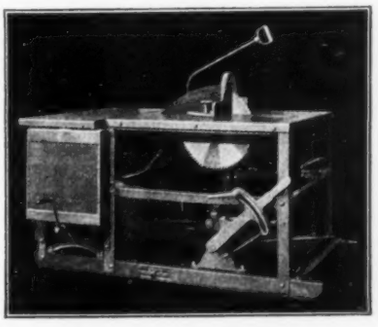
C. H. & E. Mortar Mixer



C. H. & E. Builders' Hoist



C. H. & E. Material Elevator



C. H. & E. Saw Rig

Speed Up

"BRING ON YOUR CAMELS!" shouted the runner, "I'm ready."

At his signal the caravan moved up. The tractor and trailers headed the procession. Teams and wagons followed. Day after day the shovel kept them busy taking away the dirt while at the same time it held the new streets to accurate grade.

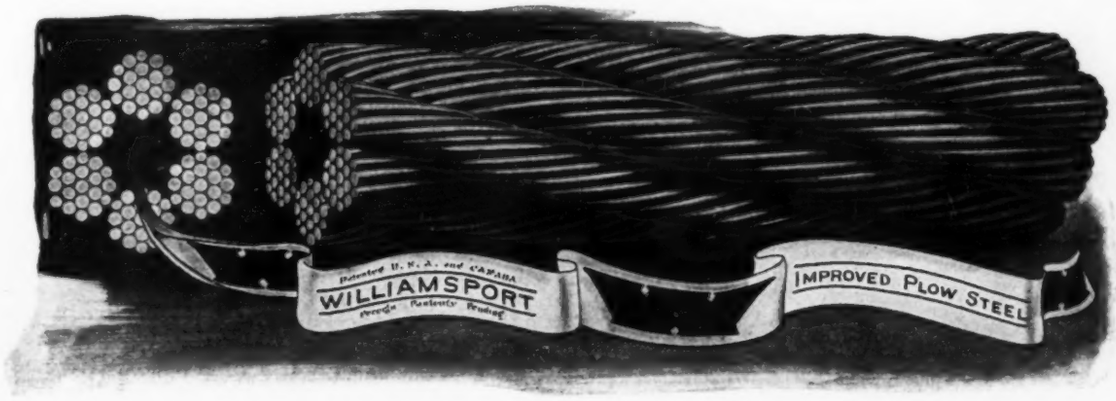
The owner of the outfit passed the remark that "There's nothing that can beat a Thew shovel and a good operator."

He should know. During the past winter his Thew has moved about 70,000 cu. yd. of earth without a single delay for repairs and it's still going strong. The job is street work on a new town site in southern Ohio. Considering the fact that the cuts are mostly shallow it's a pretty good yardage record, although not at all an unusual one for the Thew.

Bulletin 111 tells you about the shovel that did it.

THE THEW SHOVEL COMPANY, LORAIN, O.

Thew
Power Shovels



BUY WIRE ROPE THE GRADE OF WHICH YOU CAN IDENTIFY

The "Telfax" Patented Tape woven into

"WILLIAMSPORT"

is the maker's assurance of its grade and quality.

It is a permanent fixed identification, not of **one** grade, but **all** grades, that the element of time cannot erase. The grade can be identified at the time you receive the wire rope and long after it passed its period of usefulness.

To mark wire rope in this way is a true test of the maker's confidence in their product. It would be unthinkable for a manufacturer to put such identification into wire rope of uncertain quality.

This is one of the most conspicuous improvements developed in the Wire Rope industry for many years.

It's protection to both dealer and consumer.

If you have never used Williamsport super-quality wire rope, get our prices and try one on your next replacement. Learn through actual use its superior advantages.

WILLIAMSPORT WIRE ROPE COMPANY

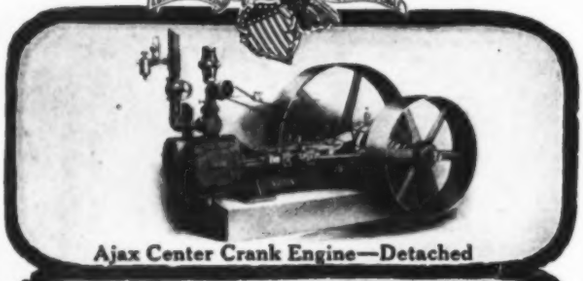
Main Office and Works — **Williamsport, Pa.**

"accepted as the best"

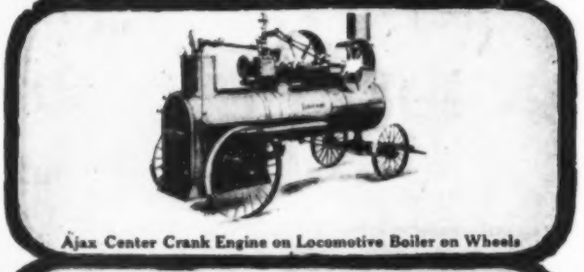
General Sales Office: Peoples Gas Bldg. — **Chicago, Illinois**

Steam vs. Gasoline

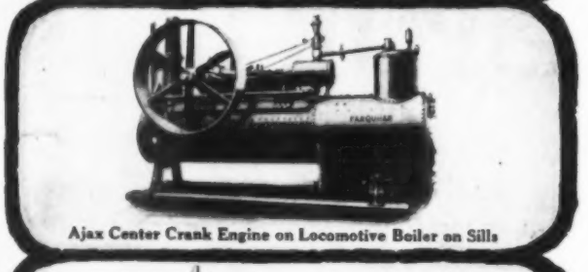
FOR the big jobs you should consider steam!



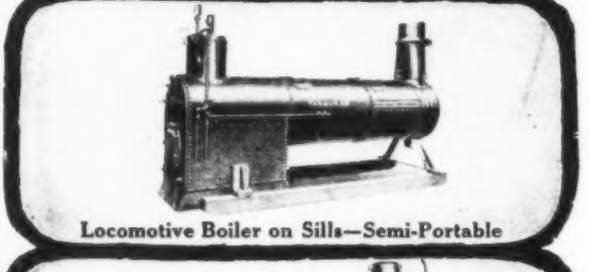
Ajax Center Crank Engine—Detached



Ajax Center Crank Engine on Locomotive Boiler on Wheels

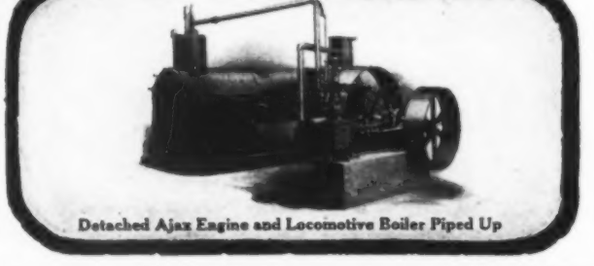


Ajax Center Crank Engine on Locomotive Boiler on Sills



Locomotive Boiler on Sills—Semi-Portable

Locomotive Boiler on Wheels—Portable



Detached Ajax Engine and Locomotive Boiler Piped Up

Because---

—the rated horse power of steam engines is usually about one-third the power developed on brake test. Not so with internal combustion engines.

—initial cost and upkeep of steam engines are less.

—there are fewer moving parts on steam engines and lubrication is simplified. No carburetor, magneto or timer to get out of order.

—steam power is more flexible—no gears to shift, and practically no vibration.

—steam power may be distributed easily and used for thawing out piles of materials, for heating "shacks" and for many other purposes.

—these are a few of the facts—a few of the reasons why contractors on the big jobs prefer steam.

The Farquhar line of steam equipment for contractors is complete. We offer both single and double cylinder tractions. Also locomotive rigs, bare boilers and detached engines as illustrated as well as vertical stationary outfits, etc.

Write for detailed information and further facts

A. B. FARQUHAR CO., LTD.
Box 478 York, Pa., U. S. A.

EXPORT DEPARTMENT ALLIED MACHINERY COMPANY OF AMERICA

Don't say that we said Red Edge will never wear out — it just seems that they won't

CITY OF WENATCHEE
STATE OF WASHINGTON

December 15th, 1921

Hoflue Ferris Equipment Company
Spokane, Wash.

Gentlemen:-

Pursuant to your request for a dozen of the Red Edge Picks, we are shipping to-day as near a dozen as we can possibly get together, as we have been lending these picks to contractors and do not know whether we can get that many together or not, and I have this to say regarding the picks

We have given these picks the hardest use of any lot of picks that we have ever had on the job for this reason. There has been considerable street improvement work in this city this summer which has made it necessary for us to lower practically all of the water mains in all of the streets improved. It is impossible or impractical to blast rock in a trench where there is a water main, so that instead, when we encountered rock under the main, we used your RED EDGE PICKS to pick them out and believe me, some of it was pretty hard work. We have never had any of these picks sharpened and we have used them constantly since the first of July. We cannot say too much in favor of the material in these picks and the same thing is true of your shovel. We never break or wear one of them out.

Yours very truly,

(Signed) CHAS. T. WHITE,

Water Superintendent

CTW/DED

Whoever wants to try to make the "most" shovels and picks in a day can do so, we are going to continue to make the "best" shovels and picks every day.

Every day they are used the cost of operating a shovel and pick is twice the cost of the shovel and pick. Ever think of that?

THE WYOMING SHOVEL WORKS

WYOMING, PENNA., U. S. A.

WYOMING RED EDGE SHOVELS

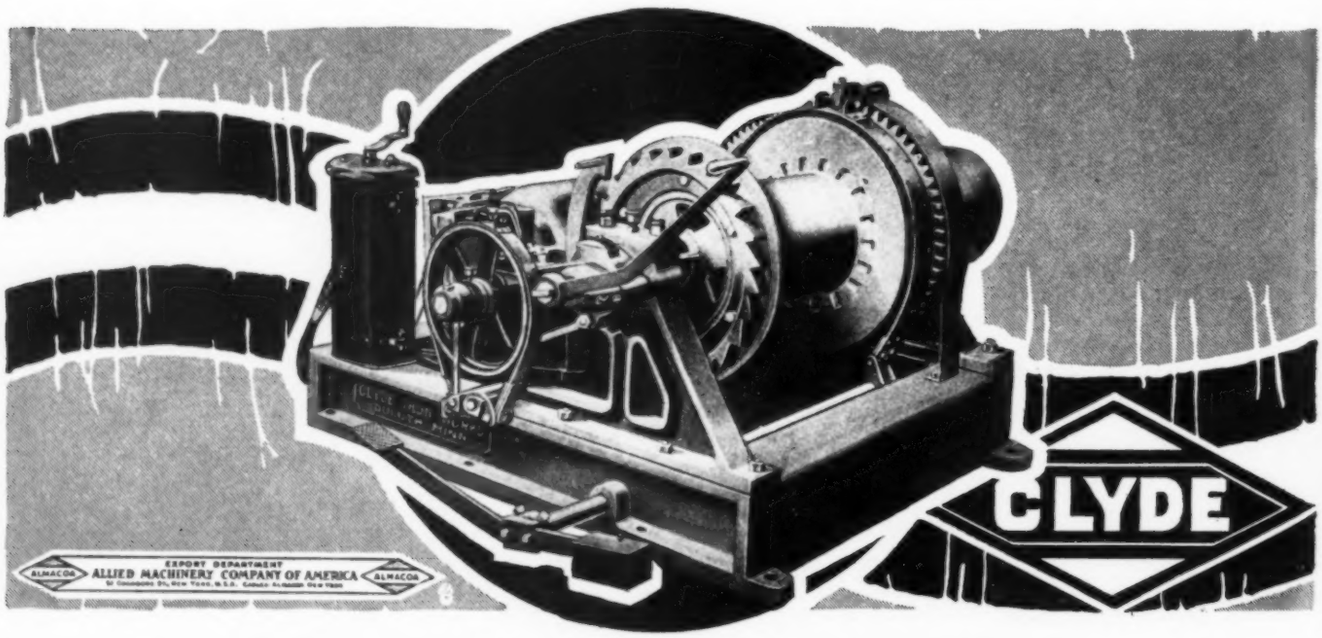
Clyde Electric Hoists

Pride of posession and of performance distinguishes owners of Clyde equipment.

The statement that Clyde hoists and derricks are the quality standard for the world is not an idle boast of the Company, but is based upon actual performance records supplied by operators in a dozen countries. Low operating costs and continuous service make for a proper realization of the actual value of a Clyde.

Every hoist built by the Clyde company is thoroughly tested before it leaves the factory. It carries an absolute guarantee against original defects and as to its capabilities. In addition, the entire Clyde organization stands behind its product throughout the life of the machine. It must maintain a definite, fixed standard.

Complete information about any portion of the Clyde line may be obtained direct from the factory or any of its branches. If you can use a copy of the Big Red Catalog, please ask for it.



THE CLYDE LINE

Steam Hoists *Electric Hoists* *Gasoline Hoists* *Belt Hoists* *Derrick Fittings*
Steel Derricks *Excavators* *Traction Cranes* *Blocks and Sheaves* *Logging Machinery*

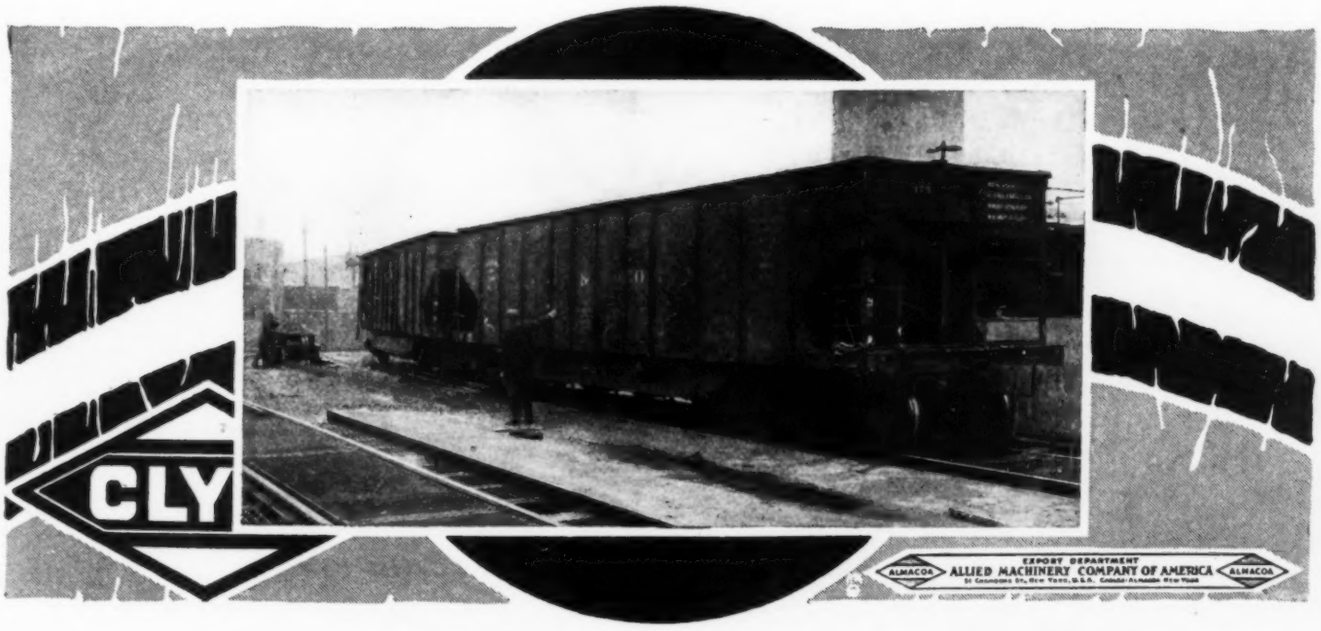
Living up to the Job

Clyde standardized equipment is being adapted everywhere to specific and varied uses.

The illustration herewith shows a one drum electric hoist spotting freight cars in the yards at Cleveland. This illustrates merely one of the hundreds of ways in which costs may be reduced by the management of a railway a manufacturing plant or of a construction operation.

Clyde hoists are built for utility and continuous service. Carefully selected and tested materials in the hands of expert mechanics who are working under the direction of highly specialized engineers are an absolute guarantee that the finished product is built to known quality standards.

A repeat order is built into every hoist of Clyde make. Proof of this statement is found among the hundreds of satisfied users who make all additions to their equipment from the Clyde line.



CLYDE IRON WORKS SALES COMPANY

Sole Distributers for CLYDE IRON WORKS, Duluth, U. S. A.

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B STANDARDIZED MATERIAL-HANDLING MACHINES G

Suited to Many Different Methods

SHOWING a Barber-Greene Portable Belt Conveyor loading a bin at a central mixing plant for St. Louis County. It was fed by a locomotive crane unloading direct from the cars or from storage, saving the time of the crane and speeding up the work.

This type of machine is also valuable for unloading cars of either bulk or sacked material. Ask for leaflet B if you wish more information on the construction and use of Barber-Greene Conveyors.

RESULTS show that no matter what particular scheme of operation is necessary on a road job to meet the variation of conditions, Barber-Greenes fit in, speed up material handling and release men for other labor.

More than two hundred machines were used by road contractors last year in almost as many different layouts of plants and material handling systems. They loaded material to wheelbarrows, horse carts, tructractors, Ford trucks, large trucks and industrial cars.

In some cases the Barber-Greenes replaced shovelers, on other jobs bins, and on others tunnels. In all cases they proved their adaptability by meeting successfully the varying conditions of each job.

Complete descriptions of twenty-four typical jobs, with operating figures, capacities and labor requirements have been assembled in a 32-page book called "Results on Road Jobs". A copy will be sent to anyone interested. ***Write for it today, no obligation.***

Barber-Greene Company

530 W. PARK AVENUE, AURORA, ILLINOIS, U. S. A.

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